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India-ASEAN Partnership for A Resilient Indo Pacific

This editorial is based on "Missed opportunity: On India and ASEAN summit in Malaysia" which was published in The Hindu on 29/11/2025. The article brings into spotlight India's deepening engagement with ASEAN rooted in shared history and strategic convergence, highlighting the 2025 summit's call for concrete action on trade, maritime security, technology, and people-to-people connectivity to forge a resilient 21st-century partnership.

Tag: GS Paper - 2, Groupings & Agreements Involving India and/or Affecting India's Interests, Effect of Policies & Politics of Countries on India's Interests, Bilateral Groupings & Agreements, Important International Institutions, Regional Groupings, Look East to Act East

Since becoming an ASEAN **dialogue partner in 1995,** India has viewed the annual summits as crucial platforms for engaging with a historically linked region of growing geopolitical significance. The Indian Prime Minister's virtual address at the 2025 ASEAN-India summit emphasized ambitious cooperation, declaring the 21st century **"the century of India and ASEAN"** and **announcing 2026 as the year of maritime partnership**. To deepen this partnership, India and ASEAN must move beyond declarations to concrete action: expediting the AITIGA review, strengthening maritime security cooperation, expanding defense and technology partnerships, and fostering people-to-people connectivity that transforms historical ties into a **resilient 21st-century partnership.**

What are the Key Areas of Convergence Between India and ASEAN?

- **Geopolitical and Maritime Security Cooperation:** Both **India and ASEAN** share a common strategic outlook on maintaining a **rules-based, free, open, and inclusive Indo-Pacific region,** viewing maritime stability as paramount for economic prosperity and security.
  - This convergence is driven by shared concerns over territorial integrity and freedom of navigation, especially in the **South China Sea, reinforcing the centrality of ASEAN-led mechanisms.**
  - **India's Indo-Pacific Oceans Initiative (IPOI)** aligns closely with the **ASEAN Outlook on the Indo-Pacific (AOIP),** fostering practical cooperation in maritime domain awareness.
    - The designation of **2026** as the **"ASEAN-India Year of Maritime Cooperation"** will institutionalize this convergence, building on the **first-ever** ASEAN-India Maritime Exercise **(AIME-2023).**
- **Economic Integration and Supply Chain Resilience:** The two parties are committed to enhancing economic connectivity and reviewing their trade agreement to achieve balanced and inclusive growth, thereby diversifying global supply chains away from single-country dependency.
  - The need for resilient supply chains was highlighted by the pandemic, making diversification a shared strategic priority.
  - The ongoing review of the **ASEAN-India Trade in Goods Agreement (AITIGA),** expected to conclude by **2025**, aims to unlock the full potential of bilateral trade, which reached **USD 121 billion in 2023-24**.
    - This economic pillar also includes India's commitment of a **$1 billion credit line** for physical and digital connectivity projects.
- **Digital Transformation and Fintech:** Convergence is strong in leveraging Digital Public Infrastructure (DPI), financial technology, and cybersecurity to drive inclusive economic growth and enhance governance across the region.
  - India's proven model of digital governance and financial inclusion offers immediate, scalable solutions for the ASEAN region's rapidly digitalizing economies.
  - Following the **2024** summit, collaboration on India's Unified Payments Interface (UPI) **and Singapore's PayNow** linkage is a landmark example, and the **ASEAN-India Fund for Digital Future** was launched in **2024** to support joint

digital projects. This push aims to enhance cross-border payments and digital service delivery.

- **Physical and Digital Connectivity:** Connectivity serves as the primary enabler of the Act East Policy, focusing on establishing seamless physical, digital, and people-to-people links that integrate **Northeast India with the ASEAN region**.
  - Accelerated infrastructure development is essential to transforming geo-strategic proximity into economic advantage, boosting trade and tourism.
  - Projects like the **India-Myanmar-Thailand Trilateral Highway and the Kaladan Multi-Modal Transit Transport Project are central**, with India allocating a **credit line of $1 billion** for connectivity and maritime infrastructure projects in ASEAN.
    - The **2025 ASEAN-India Summit** reiterated the need for their swift completion.
- **Defence Cooperation and Counter-Terrorism:** A shared threat perception from **transnational terrorism, piracy, and radicalization** has cemented a strong convergence in defence and security dialogue, capacity building, and joint exercises.
  - This collaboration is crucial for maintaining regional stability and coordinating responses to non-traditional security challenges.
  - India co-chairs the **Expert Working Group on Counter-Terrorism with Malaysia under the ASEAN Defence Ministers' Meeting-Plus (ADMM-Plus) for the 2024–2027 cycle,** showing deeper institutional integration. India's growing defence exports, like the **BrahMos missile sales to the Philippines**, further exemplify this strategic alignment.
- **Sustainable Development and Green Energy Transition:** Both entities recognize the critical challenge of climate change and are converging on sustainable development goals by **promoting renewable energy, the circular economy, and environmentally friendly tourism.**
  - This area addresses shared vulnerabilities related to energy security and environmental degradation.
  - The **2025 Joint Leaders' Statement on Sustainable Tourism** outlined a collaborative vision for promoting ecotourism and green investment, complementing India's support for the **ASEAN Power Grid** and collaboration under the **International Solar Alliance (ISA)**.
    - This focuses on low-carbon infrastructure and technology sharing.
- **Socio-Cultural and People-to-People Ties:** The deep historical and civilizational links, evident in shared heritage **(e.g., Ramayana traditions)**, serve as the **foundational soft power that strengthens mutual understanding and fosters enduring trust.**
  - Enhancing **people-to-people interaction** is key to sustaining the Comprehensive Strategic Partnership for the long term.
  - India offers scholarships and training programs and focuses on youth exchanges, having recently proposed establishing a **Centre for Southeast Asian Studies at Nalanda University in 2025.**
    - India's commitment to capacity building is supported by the dedicated **ASEAN-India Science & Technology Development Fund**.

What are the Key Areas of Friction Between India and ASEAN?

- **Widening Trade Imbalance and FTA Friction:** The **ASEAN-India Trade in Goods Agreement (AITIGA)** has resulted in a disproportionate widening of India's trade deficit, raising concerns over reciprocal market access and the efficacy of the pact.
  - Indian industries argue that the **concessions are skewed, allowing cheap imports from ASEAN while their exports face non-tariff barriers,** making the current AITIGA review contentious.
  - India's trade deficit with ASEAN widened **from USD 7.5 billion in 2011 to approximately USD 44 billion in 2023,** reflecting faster import growth versus India's export growth.

- This structural asymmetry, combined with **India's prior withdrawal from RCEP in 2019**, creates a perception of trade caution that slows the AITIGA review process.

- **Slow Progress on Key Connectivity Projects:** India's flagship physical connectivity initiatives, crucial for integrating the **Northeast region with Southeast Asia**, have faced significant delays due to political instability, security concerns, and bureaucratic hurdles. This failure to meet infrastructure timelines undermines India's credibility and weakens the tangible impact of its **Act East Policy**.
  - Both the **India-Myanmar-Thailand Trilateral Highway** and the **Kaladan Multi-Modal Transit Transport Project** have suffered years of delay, largely due to **conflict and security issues in Myanmar** following the **2021 military coup**.
  - The road component of the Kaladan project remains incomplete, stalling regional logistics.
- **ASEAN's Economic Dependence on China:** The deep economic influence of China in Southeast Asia poses a major strategic constraint, limiting how far **ASEAN nations are willing to align with India on issues that might antagonize Beijing.**
  - ASEAN must balance its economic dependence on China with its strategic need for alternative partners like India.
  - China and ASEAN have signed an **upgraded free trade pact to enhance market access amid U.S. tariffs, boosting trade in various sectors.**
    - This imbalance makes most ASEAN states prioritize economic neutrality over deeper strategic alignment with India, particularly concerning the South China Sea.
- **Strategic Ambiguity and the Quad Factor:** Many ASEAN members remain cautious **about India's participation in the Quad (with the US, Japan, and Australia)** and other emerging security groupings, fearing such frameworks could undermine **ASEAN Centrality** in regional architecture.
  - This reflects **ASEAN's traditional preference for non-alignment** and its reluctance to be drawn into great-power rivalries.
  - While India supports **ASEAN's Outlook on the Indo-Pacific (AOIP)**, ASEAN states vary in their commitment to a rules-based order, and there is no collective endorsement of India's stance on the **South China Sea**.
    - Only a few front-line states, such as **Vietnam and the Philippines**, actively seek a **stronger Indian strategic role.**
- **Divergent Approaches to the Myanmar Crisis:** India's policy of maintaining pragmatic engagement with **Myanmar's ruling military junta contrasts** with ASEAN's collective efforts to pressure the regime through the **Five-Point Consensus (5PC)**, creating diplomatic friction and weakening regional coherence.
  - India prioritizes border security and connectivity over a strong pro-democracy stance.
    - This divergence complicates a unified regional response to stabilizing the shared border.
- **Digital Governance and Data Sovereignty Clashes:** Differences in digital trade regulations, data governance norms, and cybersecurity policies hinder deeper collaboration in the high-growth digital economy, where India has strong comparative advantages.
  - India's emphasis on **data sovereignty** contrasts with the **more open digital trade approach preferred by several ASEAN members.**
  - India's push for **data localization** through the **Digital Personal Data Protection Act (DPDP), 2023** creates **friction with ASEAN economies such as Singapore,** which support free cross-border data flows.
    - This regulatory mismatch slows progress toward a seamless, region-wide fintech and e-commerce ecosystem.
- **Low Diplomatic and Cultural Visibility:** Despite the upgraded **Comprehensive Strategic Partnership**, India's diplomatic and cultural engagement with **ASEAN** is often viewed as inconsistent compared to other dialogue partners.

- This uneven engagement contributes to a perception gap and limits the depth of people-to-people trust.
- The **virtual absence of the Indian Prime Minister** from the **2025 ASEAN-India Summit** in **Kuala Lumpur** contrasting with the attendance of other major world leaders was noted by host nation leaders.
- Additionally, funding for key cultural and educational initiatives remains **modest** relative to the scale of India's strategic ambitions in the region.

What Measures can India Adopt to Enhance Ties with ASEAN?

- **Establishing a Project Implementation Unit:** India should set up a dedicated, high-level **Project Implementation Unit (PIU) under the Ministry of External Affairs,** with delegated financial and operational powers, to oversee major connectivity and development projects in the ASEAN region.
  - This "**Act Fast**" mechanism would bypass inter-ministerial delays and bureaucratic bottlenecks that have hampered projects like the Trilateral Highway.
  - The PIU's mandate must include real-time risk assessment and security coordination with host nations to ensure continuous on-ground progress—making India a **reliable and rapid development partner**.
- **Pioneering a Digital Governance Template:** India must proactively offer a **Digital Governance Template** modeled on its successful **Digital Public Infrastructure (DPI)** stack but adapted to ASEAN's diverse regulatory landscape.
  - This should include interoperable cross-border payment systems beyond Singapore, a unified **ASEAN-India Digital Skills Framework** for upskilling, and a standardized data sovereignty and cybersecurity framework balancing national security with digital trade liberalization.
  - Such efforts would position **India as a leader in Smart-Tech Diplomacy for the Global South.**
- **Formalizing Critical Minerals and Supply Chain Pacts:** To strengthen economic security and counter supply chain vulnerabilities, India should propose a **Strategic Minerals and Technology Supply Chain Resilience Pact** with resource-rich ASEAN members like Indonesia and Vietnam.
  - This pact would secure reliable sourcing of **rare earth elements and semiconductors**, backed by Indian investment in downstream processing facilities in ASEAN.
  - By fostering joint value-chain creation, it would provide a tangible alternative to existing dependencies and reinforce a stronger **economic security architecture** in the Indo-Pacific.
- **Institutionalizing Blue Economy and Naval Logistics Support:** India should expand the **Year of Maritime Cooperation 2026** into a **permanent institutional framework**, offering continuous **Naval Logistics and MRO (Maintenance, Repair, and Overhaul)** support at its eastern ports and select ASEAN facilities.
  - A dedicated **Blue Economy and Marine Technology Research Fund** could support collaboration in deep-sea mining, sustainable fisheries, and non-traditional maritime security.
  - This would consolidate India's role as a **Net Security Provider** in the Indian Ocean and the Bay of Bengal.
- **Upgrading the AITIGA Review Mandate:** The ongoing AITIGA review should move beyond tariff discussions and focus on deeper structural reforms. It must include **Mutual Recognition Agreements (MRAs)** for professionals in IT, healthcare, and engineering, and streamline **Rules of Origin (RoO)** verification to prevent trade deflection.
  - India should also offer **reciprocal single-window customs clearance** to ASEAN, demonstrating commitment to **balanced trade facilitation** and addressing the non-tariff barriers faced by Indian exporters.
- **Establishing a Dedicated ASEAN-India Policy Endowment:** India should create a **Permanent ASEAN-India Policy Endowment**, distinct from

existing government funds, managed by a joint board of diplomats, academics, and business leaders.

- The endowment would finance **Track 1.5 and Track 2 dialogues**, promote **ASEAN language training** in Indian universities, and sponsor a **Youth Innovation Challenge** on shared priorities like urban resilience and climate action, ensuring long-term **socio-cultural sustainability**.

- **Spearheading a Green Grid Integration Initiative:** India must leverage its expertise in **renewable energy integration** to help fast-track the **ASEAN Power Grid** through technical assistance in grid modernization, the creation of **Green Energy Corridors**, and collaboration on battery storage and EV infrastructure standards.
  - This form of **Green Diplomacy** would advance shared climate goals and position India as a pivotal partner in ASEAN's transition to a **sustainable and energy-secure future**.

Conclusion:

ASEAN-India partnership stands at an inflection point- where shared history must now evolve into shared destiny. By translating intent into implementation, both sides can build a resilient Indo-Pacific rooted in trust, technology, and transparency. The path forward lies not in parallel pursuits, but in synchronized progress. ***"True partnerships aren't built on proximity of geography, but on the symmetry of purpose."***

Strengthening the Rare Earth Sector in India

This editorial is based on " Where is India in the rare earths game?" which was published in The Indian Express on 31/10/2025. The article highlights India's peripheral role in the global rare earths and critical minerals landscape, underscoring China's overwhelming dominance, the technological and policy gaps in India's mining and processing capacity, and the urgent need for strategic investments and international collaborations to achieve self-reliance.

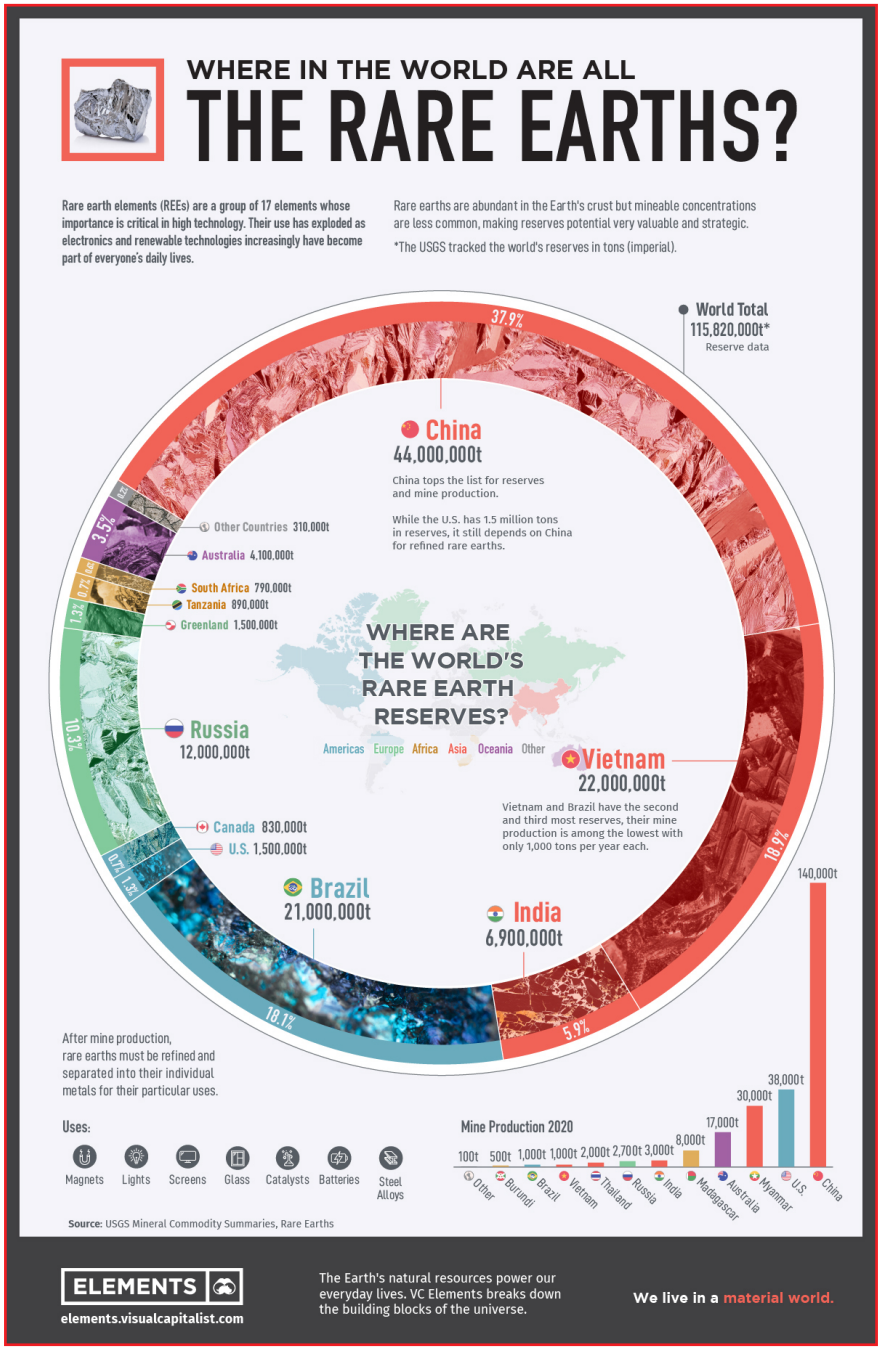
Tag: Industrial Policy, Industrial Growth, Planning, Mobilisation of resources, GS Paper 1, Geography, Distribution of Key Natural Resources, Mineral & Energy Resources

The **recent agreement between Donald Trump and Xi Jinping** underscores the **strategic competition** over **rare earths**, crucial for **electric vehicles (EVs)**, **renewable energy**, and **defence technologies**. Despite **India's rich reserves** and ongoing **policy initiatives**, persistent **technological** and **infrastructural challenges** hinder rapid **self-reliance**. Grasping these **geoeconomic dynamics** is essential for **India's ambition** to **challenge China's dominance** and emerge as a **global leader** in the era of **clean energy**, **advanced electronics**, and **strategic autonomy**.

What are Rare Earth Elements (REEs)?

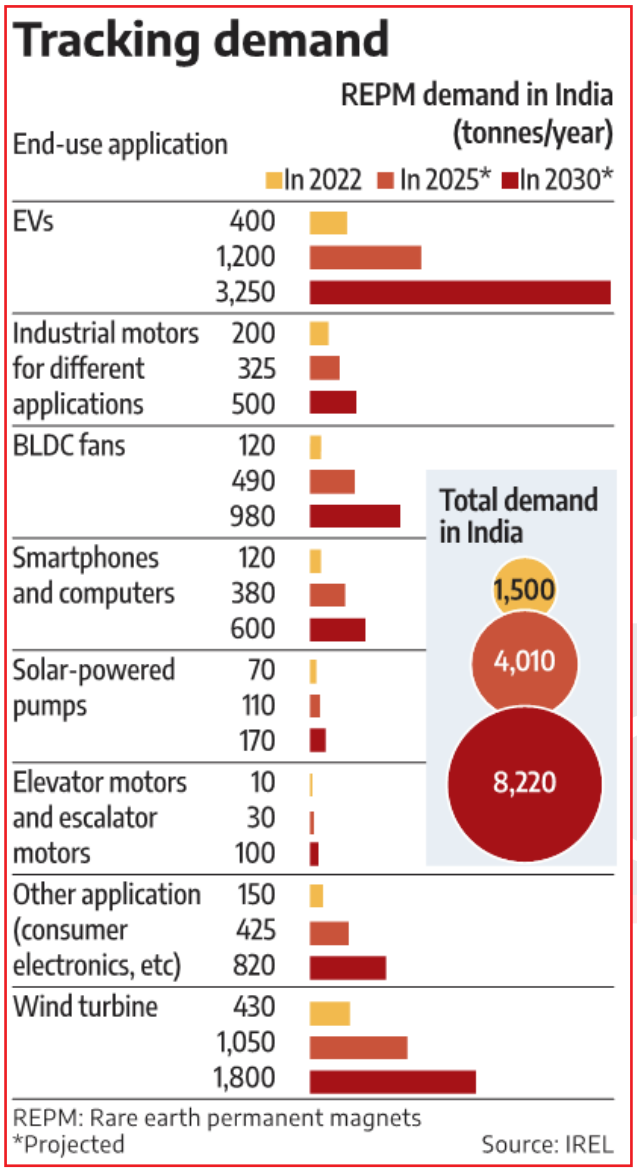
- **About:** The term Rare Earth Elements (REEs) refers to a set of **17 metallic elements**: the **15 lanthanides** plus **Scandium (Sc)** and **Yttrium (Y)**, which share very similar **chemical properties**.
  - The lanthanides include: **La (Lanthanum)**, **Ce (Cerium)**, **Pr (Praseodymium)**, **Nd (Neodymium)**, **Pm (Promethium)**, **Sm (Samarium)**, **Eu (Europium)**, **Gd (Gadolinium)**, **Tb (Terbium)**, **Dy (Dysprosium)**, **Ho (Holmium)**, **Er (Erbium)**, **Tm (Thulium)**, **Yb (Ytterbium)**, **Lu (Lutetium)**.
  - The phrase **"rare earth"** is somewhat misleading because these elements are **relatively abundant** in the **Earth's crust**, but they are rarely found in **economically viable concentrations** or **easy-to-extract deposits**.
- **Unique Features:**
  - Many REEs have **strong magnetic, luminescent, or electrochemical properties**.
    - For example, **alloys of Nd (neodymium)** and **Sm (samarium)** form **powerful permanent magnets**, able to operate at **high temperatures**.
  - Because of these characteristics, REEs are **vital in modern technologies**, including **electronics**, **defence**, **medical devices**, and **clean energy systems**.

- **Global Distribution:**
  - According to data, countries such as **China**, **Vietnam**, and **Brazil** have very large **REE reserves**.
  - According to the **US Geological Survey (USGS)**, **China** possesses around **44 million metric tons** of **rare earth oxide (REO) equivalent**, accounting for approximately **48% of the world's total reserves**.
  - **India** has about **6% of the world's rare earth reserves** but produces only around **1% of global output**.
    - States like **Kerala**, **Tamil Nadu**, **Odisha**, **Andhra Pradesh**, and **Gujarat** have significant potential for **mining and processing**.



What is the Strategic Significance of Rare Earth Metals for India?

- **Crucial for India's Clean Energy Transition and Climate Goals: Rare earth elements (REEs)** are indispensable for **clean energy technologies**, including **permanent magnets** used in **wind turbines**, **catalysts in solar cells**, and **batteries in electric vehicles (EVs).**
  - India has emerged as a **global clean energy leader**, ranking **4th globally** in **Renewable Energy (RE) Installed Capacity**, **3rd in solar**, **4th in wind**, and boasting the **world's fastest-growing renewable energy program**.
  - The demand for **rare earth magnets** in sectors like **wind energy** and **EVs** is expected to nearly **double by 2030**, aligning with India's **net-zero emission target (2070)**.
- **Essential for National Defence and Strategic Autonomy: Rare earth metals** are critical for **advanced defence technologies** such as **missile guidance systems**, **communication devices**, **radar**, and **electronic warfare equipment**.
  - India currently **relies heavily on imports**, primarily from **China**, creating **vulnerabilities**.
  - **Geopolitical tensions, trade restrictions, and global competition**, especially from **China**, which controls **60% of global REE production and 85% of processing capacity**, highlight the urgent need to develop a **self-reliant supply chain** to secure India's **clean energy goals, industrial growth, and national security**.
  - By developing **indigenous REE mining and processing capacity**, India can **enhance defence preparedness** and **reduce risks** associated with **supply disruptions**, thus strengthening its **strategic autonomy** amidst **geopolitical uncertainties**..
- **Boosting Economic Growth and Job Creation:** India possesses the **third-largest rare earth reserves globally** (about **6.9 million tonnes**), primarily in **coastal regions** (**Kerala**, **Tamil Nadu**, **Odisha**).
  - With the **Indian rare earth market** valued at over **USD 9 billion (2024)** and expected to grow significantly, expanding **rare earth mining and processing** can unlock **economic benefits**.
  - Government initiatives such as the **Production-Linked Incentive (PLI) schemes** for **rare earth magnet manufacturing** are expected to **create significant employment opportunities**, **boost industrial growth**, and **reduce India's dependence on imported rare earth-based products**.
  - The **National Critical Mineral Mission** and related policies aim to **expedite exploration** and **processing** while **balancing ecological norms**, highlighting India's need to **overcome technical and regulatory hurdles** to **unlock resource potential**.
- **Supporting the 'Make in India' Vision Through Value Chain Development:** India's current **rare earth ecosystem** is mainly **upstream mining and extraction** with limited **downstream processing** and **magnet production**.
  - Major **investments** are underway to build **full value chains**, including **magnet manufacturing plants** in **Visakhapatnam** and **integrated refining facilities** in **Kerala** and **Odisha**.
  - These efforts align with **"Make in India"** to promote **domestic manufacturing** of **high-value rare earth products**, **reduce import dependency**, and position India as a **global supplier**.
- **Strategic Reserves and International Collaboration to Secure Supply:** India is actively developing **strategic stockpiles** of **critical rare earth minerals** to **mitigate supply shocks**.
  - It is also pursuing **partnerships** with **resource-rich countries** and forming **alliances like the Quad** to **diversify sources**.
  - Such **geopolitical and trade strategies** enhance India's **bargaining power**, **ensure material security**, and **hedge against supply disruptions** caused by **political instability** or **trade wars** involving China.



What are the Primary Challenges India Faces in Expanding Its Rare Earth Mining and Processing Industry?

- **Limited Domestic Production and Outdated Infrastructure:** Although **India holds the world's third-largest rare earth oxide reserves** (about **6.9 million tonnes**) and nearly **35% of global beach sand mineral deposits**, its **actual production remains modest**, with **mine output at only around 2,900 metric tons per year — less than 1% of global supply**.
  - This disparity highlights the country's **outdated infrastructure and limited processing capacity**, which hinder efficient extraction and value addition.
  - **Bridging the gap between reserves and production** will require **modernising facilities, upgrading technology**, and **expanding capacity** to realise India's full potential in the rare earth sector.
- **Geopolitical and Supply Chain Vulnerabilities:** India's **dependence on imports** from **geopolitically sensitive regions**, particularly **China**, exposes its **critical technology sectors** to **supply disruptions**.
  - The ongoing **global competition** for **critical minerals** exacerbates **price volatility** and **availability risks**.
  - Recent **Chinese export restrictions** underscore this **vulnerability** and highlight India's urgent need to develop **indigenous refining, alloy manufacturing**, and **magnet production capabilities**.
- **High Capital Costs and Long Lead Times:** Establishing **integrated mining and processing infrastructure** demands **substantial investment**.
  - India's plans to **triple rare earth magnet manufacturing capacity by 2032** require **hundreds of millions of dollars** in capital and **dedicated policy incentives**.
  - Such projects typically have **long gestation periods**, delaying **immediate benefits** and testing **investor patience**.
    - **India's rare earth ambitions** are likely to face a **gestation period of at least 15 years** before achieving **substantial self-reliance** in exploration, processing, and manufacturing.
- **Lack of Downstream Processing and Value Addition:** India's **rare earth sector** primarily focuses on **mining and initial processing** (like **separation and oxide production**).

- However, it has **limited capabilities** in producing **intermediate products** like **alloys**, **permanent magnets**, and **finished components** essential for **advanced technology applications**.
- This **incompleteness** weakens India's **position in the global value chain** and necessitates **large-scale capacity building**.

- **Environmental and Social Risks: Rare earth mining** involves extracting **minerals associated with radioactive elements** like **thorium**, posing **environmental and health hazards** requiring stringent **regulatory oversight**.
  - Extracting **rare earth minerals**, especially from **coastal monazite sands**, risks **ecological damage** such as **soil degradation** and **water contamination**, potentially impacting **local communities**.
  - The **radioactive nature** of some deposits requires **safe waste disposal**.
  - **Environmental clearances**, **Coastal Regulation Zone (CRZ) norms**, and the need to conduct **detailed impact assessments** slow project approvals.
  - **Balancing ecological concerns** with the **economic imperative** of rare earth mining remains **challenging**.

What Major Government Initiatives Have Been Undertaken by India to Develop and Secure the Rare Earth Materials Sector?

- **National Critical Mineral Mission (NCMM),2025: ** Launched in **January 2025** with a **budget of ₹16,300 crore**, the **NCMM** aims to ensure India's **long-term critical mineral security**, including **rare earth elements (REEs)**.
- **Production Linked Incentive (PLI) Scheme for Rare Earth Magnets:** Announced in **2025**, this scheme allocates **₹7,350 crore** to **incentivise domestic manufacturing** of **rare earth permanent magnets**, vital for **electric vehicles (EVs)** and **renewable energy technologies**.
  - The goal is to **triple India's magnet production capacity by 2030**, **reduce imports**, and **foster an integrated domestic supply chain**.
- **Strategic Stockpiling of Rare Earths and Critical Minerals:** The government plans to create **strategic mineral stockpiles** to **buffer supply shocks**, especially given the **concentration of rare earth supply** in **geopolitically sensitive countries** like **China**.
- **Centres of Excellence (CoEs) and Research Ecosystem:** Multiple **Centres of Excellence** have been established under **NCMM** in premier institutions like **IISc Bengaluru** and **C-MET Hyderabad** to drive **R&D**, **innovation**, **patent development**, and build **local technological capabilities** aligned with the **global critical minerals challenge**.
- **Policy Reforms for Mining and Exploration:** The government has **simplified licensing**, **auctioned mining blocks** (around **20 blocks**), and introduced **regulatory reforms** to promote **private sector participation** in **rare earths mining** and **downstream processing**.
  - Inclusion of **critical minerals under Part D of the first schedule of the MMDR Act,1957** gives the **Central Government control** over leases, facilitating **coordinated development**.
- **Recycling and Circular Economy Initiatives:** In addition to mining, the government supports **enhancing recycling** of **rare earths from electronic waste (e-waste)** by approving **incentive schemes** and **research programs** focused on **sustainable recovery**, thereby **reducing dependence on virgin mining** and promoting a **circular economy**.

What Measures Should India Adopt to Effectively Strengthen Its Rare Earth Materials Ecosystem?

- **Fully Implement and Scale up the National Critical Mineral Mission (NCMM):** India should **expedite** the ambitious **NCMM initiative** to enhance **mineral mapping**, **exploration of 1,200 critical mineral projects by 2030**, and development of **domestic processing capabilities**.
  - **Rigorous implementation** with **strong policy coordination** among ministries will help India extract value from its **6.9 million tonnes of rare earth reserves** and improve its **strategic autonomy**.
  - India may learn from **global best practices** like the **US Department of Defence's public-private partnership with MP Materials** to build **vertically integrated rare earth supply chains**, backed by **long-term procurement guarantees**.
- **Develop Strategic Integrated Rare Earth Manufacturing Clusters:** Taking a cue from **Australia's cluster model**, where **mining and refining hubs** exist with access to **infrastructure** and **skilled labour**, India should prioritise **integrated hubs** in **Odisha (LREEs)**, **Andhra Pradesh (HREEs)**, and **Tamil Nadu (magnet manufacturing)**.
  - This will reduce **logistics costs**, improve **efficiency**, and attract **investment** by creating **economies of scale** and **specialised talent pools**.
- **Establish Strategic Stockpiles and Market Stabilization Mechanisms:**Creating **government-backed strategic reserves** of **rare earth minerals** and instituting **price floors** or **minimum procurement guarantees** can **stabilize supply** and shield **critical industries** against **price volatility**.

- India may learn from the **US Pentagon's price floor and guaranteed offtake model** in its **rare earth magnet manufacturing program**, enhancing **market certainty** and **investor confidence**.

- **Substantially Expand Production Linked Incentive (PLI) Schemes for Rare Earth Magnets:** India must **increase PLI funding** to nurture **innovation hubs** and scale **magnet production** to meet at least **15% of global demand by 2030**, supporting **electric vehicle (EV)** and **renewable energy sectors**.
  - India may learn from **Australia's government-backed investments**, including a **$1.25 billion loan to Iluka Resources** for building **rare earth refineries**, enhancing **downstream production** and **exports**.
- **Invest Heavily in Research, Development, and Circular Economy Models:**India must establish **Centres of Excellence (CoEs)** to develop **green mining** and **eco-friendly extraction technologies**. **Recycling rare earths from e-waste**, an emerging global best practice in **Japan and South Korea**, should be aggressively promoted to reduce **virgin mining dependence**.
  - Encouraging **startups**, **industry–academia collaboration**, and **innovation ecosystems** can accelerate **technology development** and ensure a **sustainable mineral economy**.
- **Harmonise Regulatory Framework and Enforce Environmental Safeguards:**India should **simplify mining and environmental clearances** without compromising **sustainability**, especially in **radiation-sensitive monazite extraction** areas.
  - Adopting **rigorous environmental management**, **rehabilitation standards**, and **community engagement** can prevent **social conflicts** and ensure **responsible mining**.
  - Such **balanced regulation** can help India match the **sustainability benchmarks** seen in **Scandinavian mining sectors**.
- **Forge Robust International Alliances and Technology Partnerships:** India should deepen ties within frameworks like the **Minerals Strategic Partnership (MSP)** and the **Quad** to access **advanced technology**, **co-invest in overseas deposits**, and build **diversified strategic supply chains**.
  - Following the **US-Australia cooperative model**, India can pursue **bilateral MoUs** to expand **processing capabilities** and reduce **China-centric supply risks**.

Conclusion:

Nobel laureate **Joseph Stiglitz** rightly observes that the key question for developing economies is not merely *"What can an economy produce today?"* but rather *"What can it learn to produce?"*—a principle that should guide **India's strategic advancement in rare earths**. To realise this vision, India must adopt a **comprehensive rare earth strategy** by swiftly operationalising the **National Centre for Mineral Materials (NCMM)**, **expanding PLI incentives**, **developing integrated industrial clusters**, and **streamlining regulations** with robust **environmental safeguards.**

From Subsistence to Smart Agriculture in India

This editorial is based on "Plug the gaps in agriculture sector" which was published in The Hindu Business Line on 03/11/2025. The article brings into focus India's agricultural paradox: 35% of the workforce drives only 10% of GVA. Bridging this gap through targeted skilling, especially for women, is essential to harness technology and make farming a driver of inclusive growth.

Tag: GS Paper - 3, Direct & Indirect Farm Subsidies, Public Distribution System (PDS), Buffer Stocks & Food Security, Agricultural Marketing

India's agriculture sector faces a stark paradox: **while contributing only 10% to national GVA, it employs 35% of the workforce,** signaling massive untapped potential for productivity growth. The sector stands at a critical juncture where rapid technological advancement, from **AI-driven crop planning** to **drone-based monitoring** clashes with a workforce **where 35% lack basic literacy** and most have received no formal technical training. Women farmers, comprising 41% of agricultural workers, face acute marginalization. The path forward demands

urgent, targeted skilling interventions particularly for women and across identified geographical clusters to bridge the widening gap between technological capability and human capacity, **transforming agriculture from a subsistence occupation into an engine of inclusive prosperity.**

What are the Key Major Recent Developments in Indian Agriculture?

- **Rollout of Digital Public Infrastructure (DPI) for Agriculture:** The government is strategically building a Digital Public Infrastructure (DPI), known as **AgriStack**, to modernize governance and service delivery across the sector.
  - This move will create an interoperable ecosystem that provides farmers with personalized and timely information, boosting efficiency and transparency in government schemes.
  - The Digital Agriculture Mission has a goal of creating digital identities for **11 crore farmers** over three years and launching a nationwide **Digital Crop Survey (DCS)** across all districts, moving from traditional manual methods to data-driven decision-making.
- **Rapid Integration and Liberalization of Drone Technology:** The deployment of **drones (UAVs)** for precision farming, particularly spraying and crop health monitoring, is a game-changer, addressing labor shortages and improving input use efficiency.
  - The **liberalized Drone Rules 2021** and financial assistance policies underscore the government's push to make this technology accessible to common farmers and Farmer Producer Organizations (FPOs).
  - The use of drones allows for up to **5 times faster** pesticide application than manual methods and significantly **reduces chemical exposure** for farm workers, with the government providing a **40-50% subsidy** for their purchase by FPOs and specific farmer categories.
- **Surge and Maturation of the Agri-Tech Startup Ecosystem:** India's Agri-Tech sector has seen a massive surge, moving beyond e-commerce to sophisticated solutions like **AI/IoT-based precision farming (Agri-IOT), quality management, and supply chain technology**. These startups bridge knowledge and market gaps, making farming a more profitable and predictable enterprise for smallholders.
  - As of December 2023, nearly **2,800 AgriTech startups** were recognized by Startup India, collectively raising approximately **₹6,600 crore** in funding over the last four years, highlighting significant private sector investment and innovative capacity.
- **Policy Focus on Promoting Millets (Shree Anna) and Crop Diversification:** A strong push is observed towards **crop diversification** away from water-intensive staples like rice and wheat, centering on promoting nutri-cereals, termed 'Shree Anna' (Millets). This shift is crucial for addressing climate change resilience, improving nutrition, and correcting groundwater depletion.
  - The year **2023** was declared the **International Year of Millets**, which correlates with total millets (**Shree Anna**) production being estimated at **174.08 LMT** in 2023-24, showcasing policy-driven momentum towards their increased cultivation.
- **Increased Emphasis on Farm Mechanization:** With rural-to-urban migration leading to labor scarcity, **farm mechanization** is critical for maintaining productivity and reducing cultivation costs, especially for small and marginal farmers. Policy support for **Custom Hiring Centers (CHCs)** is key to making expensive machinery accessible.
  - Under the Sub-Mission on Agricultural Mechanization (SMAM), the government has provided financial assistance, resulting in the establishment of thousands of CHCs, with **57,139 farmers trained** in mechanization between 2021-25.
- **Strengthening the Role of Farmer Producer Organizations (FPOs):** FPOs are fundamentally transforming the market landscape by **collectivizing small and marginal farmers**, enhancing their

collective bargaining power, and enabling better access to inputs, technology, and formal credit.

- This structure is vital for realizing economies of scale. The government is actively promoting the formation of **10,000 new FPOs** to cover the entire country, which helps improve market linkage and allows farmers to receive better price realization for their produce.

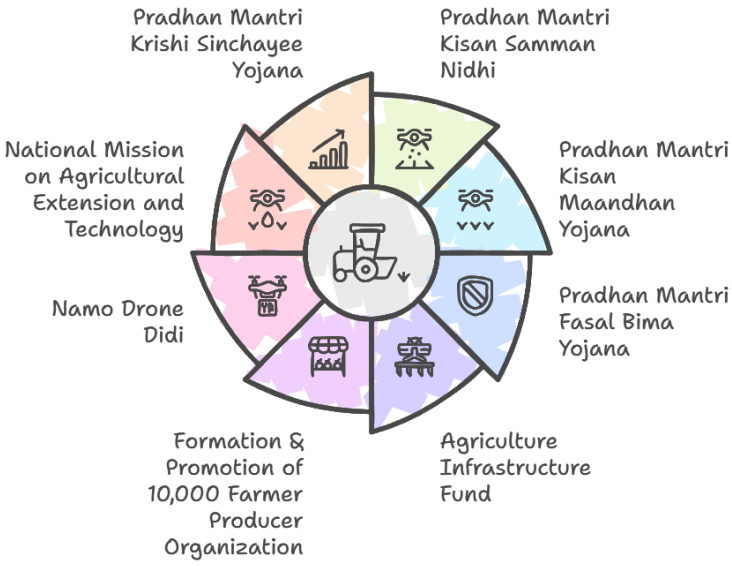
- **Sustained Growth in Horticulture and Non-Food Crops:** The horticulture sector, encompassing **fruits, vegetables, and spices,** has continued its robust growth trajectory, driven by increasing domestic and export demand, diversification efforts, and better post-harvest management.
  - This is essential for boosting farm income and value addition. The latest estimates show horticulture production at an impressive **352.23 Million Tonnes in 2023-24 (Second Advance Estimates),** with fruit production specifically expected to reach **112.63 Million Tonnes**, affirming its **status as a high-value growth area.**

What are the Major Issues Hindering Productivity and Growth in Indian Agriculture?

- **Extreme Fragmentation of Land Holdings and Small Farm Size:** The **highly fragmented nature of land ownership** prevents economies of scale, making the adoption of large-scale mechanization and modern irrigation systems economically unviable for the majority of farmers.
  - This structural constraint limits capital investment and results in suboptimal resource utilization, directly suppressing overall farm productivity.
  - As per the latest Agriculture Census data, **86.2% of total operational holdings** in India are marginal and small **(less than 2 hectares),** with the average size of operational holdings having declined to just **1.08 hectares**, severely hindering efficiency.
- **Under-investment in Post-Harvest Infrastructure and Supply Chain:** A profound **deficit in cold storage, warehousing, and processing infrastructure** across the country leads to massive wastage and forces farmers into distress selling immediately post-harvest.
  - This weak supply chain prevents farmers from realizing better value, thus making farming less profitable and discouraging investment in productivity-boosting inputs.
  - Estimates suggest that post-harvest losses, particularly for perishable commodities like **fruits and vegetables,** range from **20% to 40%,** representing an annual economic loss of thousands of crores of rupees.
- **Persistent Dependence on Erratic Monsoon and Groundwater Depletion:** A large portion of the net sown area remains **rain-fed**, making agricultural output highly vulnerable to the **increasingly erratic and** extreme weather events induced by climate change, despite extensive irrigation projects.
  - The over-extraction of groundwater in irrigated areas, fueled by subsidized electricity and water-intensive cropping patterns, is leading to a major **water-stress crisis**.
  - Only about **55% of the gross cropped area** is currently irrigated, leaving nearly half dependent on the monsoon, while India is reported to have the **highest rate of groundwater depletion** globally.
- **Widespread Decline in Soil Health and Imbalanced Nutrient Use:** The decades-long, **imbalanced application of chemical fertilizers**, particularly the disproportionate use of **Nitrogen (N) over Phosphorus (P) and Potassium (K),** has severely degraded soil health, leading to nutrient deficiencies and loss of organic carbon.
  - This degradation directly impacts crop yields and undermines the long-term **sustainability** of intensive farming practices.
  - The **ideal NPK ratio is 4:2:1,** but the current usage ratio in India is often heavily skewed, with the national average reported to be around **6.7:2.4:1**, highlighting severe nutrient imbalance.

- **Limited Access to Timely Institutional Credit for Marginal Farmers:** Despite significant efforts in financial inclusion, a large segment of **small and marginal farmers** still **relies on high-interest informal money lenders** due to insufficient collateral or complex bureaucratic procedures for formal credit.
  - This lack of affordable, **timely credit** limits their capacity to purchase quality inputs, adopt technology, or make essential farm investments.
  - The proportion of rural households with **outstanding debt rose from 47.4% in 2016-17 to 52% in 2021-22,** demonstrating a persistent gap in institutional financial outreach.
- **Ineffective Agricultural Research and Extension Services:** The linkage between **cutting-edge agricultural research** conducted by state and central institutions and its effective transfer to the grassroots level remains weak, often due to under-resourced and outdated extension systems.
  - This crucial gap prevents the timely adoption of High-Yielding Varieties (HYVs), better techniques, and climate-resilient farming practices by the average farmer.
  - Public expenditure on agricultural R&D in India is estimated to be around **0.3-0.4% of Agri-GDP**, which is significantly lower than the **1% to 2% target** recommended for developing countries.
- **Market Access Barriers and Price Volatility:** Farmers face significant challenges in **efficiently marketing their produce**, including the dominance of local traders, lack of transparent price discovery mechanisms, and high intermediation costs in traditional markets (APMCs).
  - This market dysfunction leads to immense **price volatility** and low farm-gate prices, diminishing the incentive for farmers to increase production.
  - The e-NAM platform, despite efforts, has integrated only around **1,522 mandis**, leaving thousands of local markets outside the digital network, which **contributes to market fragmentation and limited price transparency.**

Key Agricultural Initiatives



What Measures can be Implemented to Boost Productivity in Indian Agriculture?

- **Mandatory Mechanization Pooling and Digitally-Managed Land Leases:** The government must proactively enforce **community land use** by mandating **Custom Hiring Centers (CHCs)** to operate on a time-bound, pooled-asset model across defined village clusters.
  - This should be combined with a **digitally-secured land leasing framework** that guarantees ownership retention while facilitating temporary consolidation for mechanized farming and large-scale precision input application.
  - This bypasses the fragmentation hurdle, achieving economies of scale for key operations like planting and harvesting.

- **Incentivizing Precision Water-Use through Smart Grid Tariffing:** Shift the focus from free or subsidized electricity/water to **outcome-based water management** by introducing a **"Smart Water Grid" tariff structure**.
  - This system would charge higher progressive rates for over-extraction beyond a scientifically determined threshold per crop, while offering significant **carbon/water credits for adopting micro-irrigation (drip/sprinkler)** and implementing rainwater harvesting structures.
  - The strategy effectively rationalizes resource use and tackles the looming groundwater crisis.
- **Establishment of Climate-Smart Crop-Genetic Hubs (CGH):** Revolutionize the R&D-to-farm process by establishing **regional Climate-Smart Crop-Genetic Hubs (CGHs)** that function as integrated centers for research, seed multiplication, and farmer training.
  - These hubs must prioritize the development and rapid dissemination of **drought-resistant, heat-tolerant, and nutrient-efficient** high-yielding seed varieties tailored precisely to the local **Agro-Ecological Zones (AEZs)**, reducing reliance on conventional staples and promoting diversification.
- **Integrated E-Post-Harvest Logistics and Cold-Chain-as-a-Service (CCaaS):** Implement a national digital platform that seamlessly integrates farm-gate inventory, nearest **modular cold storage units**, and final market demand points, transforming the current fragmented supply chain into an **end-to-end Cold-Chain-as-a-Service (CCaaS)** network.
  - This system, driven by IoT and blockchain, would dramatically **reduce storage losses**, enable just-in-time value addition, and empower farmers to access remunerative spot and forward markets building upon **Dalwai Committee's recommendations for doubling farmers' income.**
- **Re-engineering Agricultural Extension via FPO-Tech Interface:** Overhaul the moribund extension system by structurally integrating all **Krishi Vigyan Kendras (KVKs)** and agricultural universities with **Farmer Producer Organizations (FPOs)**, turning the FPOs into the primary interface for **technology diffusion and knowledge transfer**.
  - This re-engineering must involve deploying **Agri-Tech entrepreneurs** at the FPO level to provide personalized, AI-driven advisory services on soil health, pest management, and market intelligence, ensuring faster technology adoption.
- **Soil Carbon Sequestration and Regenerative Farming Subsidies:** Pivot fertilizer subsidies towards rewarding **regenerative agriculture and soil health improvement** by introducing a direct, tiered subsidy for farmers actively increasing **Soil Organic Carbon (SOC)** levels.
  - This measure directly addresses soil degradation by incentivizing practices like cover cropping, zero-tillage, and crop rotation, thereby promoting **sustainable intensification** and reducing the reliance on chemical inputs over the medium term.
- **Securitization of Future Farm Output for Credit Enhancement:** Create a novel financial instrument by allowing FPOs to **securitize their members' projected future harvests (based on historical production and forward contracts) to secure credit at favorable institutional rates**, bypassing the requirement for traditional land collateral.
  - This measure directly addresses the **credit barrier** for smallholders, enabling them to invest in high-value inputs and technology, thus fundamentally linking production potential to capital access.

Conclusion:

India's agriculture stands at a transformative crossroads—**where technology, innovation, and human capital must converge to unlock its true potential.** Bridging gaps in skills, infrastructure, and credit will empower farmers, especially women, to drive inclusive and sustainable growth. Strengthening agri-value chains, promoting climate-smart practices, and ensuring equitable access to resources align directly with **SDG 1 (No Poverty),**

SDG 2 (Zero Hunger), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 12 (Responsible Consumption and Production), paving the way for a resilient and prosperous rural India.

Strengthening Panchayati Raj Institutions in India

This editorial is based on "The vision of Model Youth Gram Sabhas", which was published in The Hindu on 03/11/2025. The article discusses the Model Youth Gram Sabha initiative, which aims to empower Indian students with practical experience in grassroots democracy by simulating Gram Sabha processes in schools, thereby fostering informed and active citizenship rooted in local self-governance.

Tag: GS Paper - 2, Local Self Governance, Government Policies & Interventions, Constitutional Amendments.

Indian democracy draws its strength from **grassroots participation**, yet a large section of **young citizens** remains **disengaged** from local governance bodies like **Gram Sabhas**. The **Model Youth Gram Sabha initiative** aims to **bridge this disconnect** by involving students in **simulated village governance**, thereby transforming **civic learning** into **hands-on democratic practice**. Despite these reforms, **Panchayati Raj Institutions (PRIs)** continue to struggle with **financial dependency**, **political interference**, **social hierarchies**, and **restricted administrative powers**.

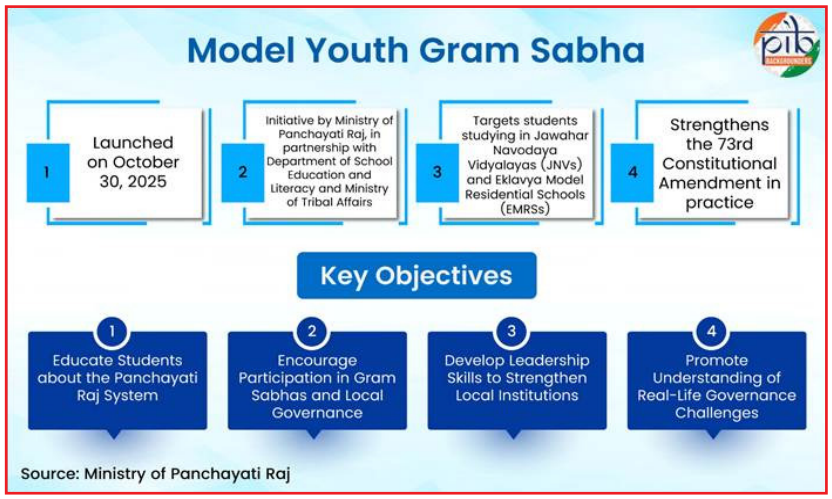
What are the Key Factors that have Shaped the Growth Trajectory of Panchayati Raj Institutions (PRIs) in India?

- **Constitutional Empowerment & Enhanced Representation:** The 73rd Amendment transformed Panchayati Raj from a discretionary state policy into a **constitutionally mandated system of local self-government**, ensuring **democratic decentralisation, accountability, and participatory governance** across India.
  - The Amendment also introduced **reservations for women (minimum 33%)** and **Scheduled Castes/Tribes**, promoting **social inclusion** and **grassroots leadership.**
  - India now has roughly **14–14.5 lakh elected women representatives (~46%)**, and 21 states have moved to 50% reservation for women — a major step in inclusive governance and women's leadership at the grassroots.
    - For instance, under the **Nari Shakti Se Jal Shakti initiative** in **Rajasthan**, **women PRI leaders** revitalised **traditional water bodies**, built **check dams**, and promoted **rainwater harvesting**, improving **groundwater levels** and ensuring **year-round water availability**.
  - In the **Bastar district**, **tribal PRI leaders** have successfully implemented **traditional forest rights** with **government collaboration**.
- **Participatory Governance via Gram Sabhas: Gram Sabhas** are platforms for **direct citizen participation** in **decision-making**.
  - To enhance **people's participation** in preparing **Panchayat Development Plans**, the **People's Plan Campaign (PPC)** was launched on **2nd October 2018** under the theme **"Sabki Yojana, Sabka Vikas."**
    - Encouraged by the positive outcomes of **Gram Sabhas**, **stakeholder engagement**, and **participatory planning**, the campaign has been conducted **annually in a mission mode** with active involvement of **Elected Representatives**, **frontline workers**, **Self Help Groups (SHGs)**, **Community-Based Organisations (CBOs)**, and other **local stakeholders**.
    - **Experts laud** the contribution of the **People's Plan** to the strides **Kerala** has made in crucial fields like **education**, **health**, **local infrastructure**, and the like, while **reducing poverty**.
  - **Social Accountability & Participatory Mechanisms** tools like **social audits (MGNREGA)**, citizen charters, public hearings and civil-society engagement have deepened political accountability.
- **Financial Decentralisation and Own Source Revenue (OSR):** Traditionally, **Panchayati Raj**

Institutions (PRIs) relied heavily on **central and state grants**, limiting their **fiscal autonomy**.

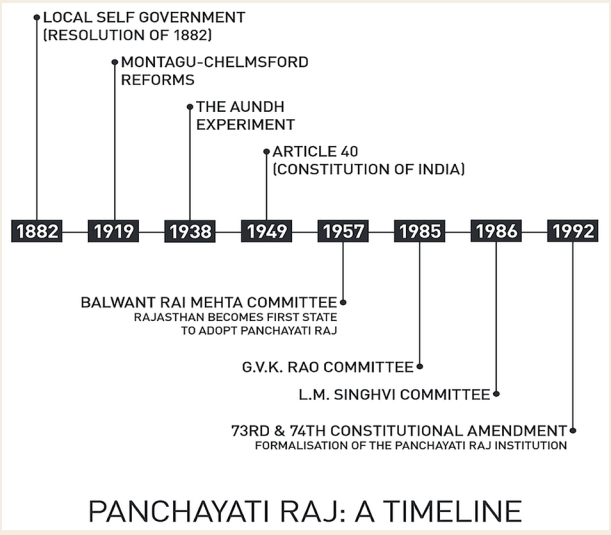
- However, **some states** have taken the lead in **local revenue mobilisation**, with **Karnataka, Kerala, Andhra Pradesh, Telangana, and Tamil Nadu** together contributing over **60% of the ₹25,595 crore OSR** generated by **Gram Panchayats** nationwide between **2017–18 and 2021–22**.
- Innovations such as the **Ministry of Panchayati Raj's Samarth Panchayat Portal**, piloted in **Chhattisgarh and Himachal Pradesh**, are helping streamline and enhance **OSR management**.
- The **15th Finance Commission** further strengthened financial devolution by recommending around **₹2.4 lakh crore** for **rural local bodies (2021–26)**, expanding their **fiscal space** and enabling greater focus on **local development priorities**.
- Recent **Finance Commission conclaves (2024)** and policy initiatives continue to **deepen fiscal federalism**, promoting **predictable, un-tied funds** and empowering PRIs to achieve **true financial autonomy**.
- As per the **Panchayat Devolution Index 2024**, the **overall devolution to rural local bodies** increased from **39.9% in 2013-14** to **43.9% in 2021-22**.

- **Capacity Building, Decentralised Planning & Digital Tools: Rashtriya Gram Swaraj Abhiyan (RGSA,revamped in 2022)** trains **elected members** and **officials** on **governance**, **finance**, and **planning**.
  - In **Tamil Nadu**, this has led to improved **budgeting** and **public works execution**, bridging **skill gaps** at the **grassroots**.
  - Institutional mechanisms like **Gram Panchayat Development Plans (GPDP)** and the **e-GramSwaraj** portal have operationalised bottom-up planning and transparency; thousands of GPDPs are uploaded and monitored online, enabling localisation of development priorities and real-time accounting of works and funds.
  - This digitalisation strengthens accountability and citizen oversight.
    - Platforms like **Panchayat NIRNAY** provide **real-time monitoring** of **scheme implementation**, increasing **transparency**.
    - In **Maharashtra**, **digitization of Gram Sabha proceedings** reduced **corruption allegations** and led to **timely execution** of **public health initiatives** during the **COVID-19 pandemic**.
  - The **Model Youth Gram Sabha** initiative actively nurtures **youth participation**, especially **tribal students**, fostering **democratic values** from the **grassroots**.
    - In **Phase 1**, the **Model Youth Gram Sabha** is being launched in over **1,000 schools** across **28 States** and **8 Union Territories (UTs)**.



What are the Key Features and Provisions of the 73rd Constitutional Amendment Act (1992)?

- **Constitutional Status and Scope:** The 73rd Constitutional Amendment Act, 1992, inserted **Part IX (Articles 243–243O)** and the **Eleventh Schedule** into the Constitution, granting constitutional recognition to Panchayati Raj Institutions (PRIs).
  - It fulfilled **Article 40** of the Directive Principles, mandating the organization of village panchayats with adequate powers and responsibilities.
- **Institutional Framework:** The Act established a **three-tier structure**:
  - **Gram Panchayat** at the village level,
  - **Panchayat Samiti** at the intermediate level, and
  - **Zila Parishad** at the district level.
- **Gram Sabha:** The **Gram Sabha** was recognized as the **base unit** of the PRI system, comprising all registered voters in a village.
  - It acts as the platform for **direct citizen participation**, transparency, and accountability in local governance.
- **Regular Elections and Fixed Tenure:** The Act mandates **regular elections every five years** for all levels of PRIs.
  - In case of early dissolution, elections must be held within **six months**, ensuring continuity of democratic functioning.
  - The Act established an **independent State Election Commission (SEC)** in each state to supervise, direct, and control PRI elections, ensuring **autonomous and impartial electoral processes.**
- **Reservation for Social Justice and Inclusion:** To promote inclusivity, the Act reserves:
  - Seats for **Scheduled Castes and Scheduled Tribes** in proportion to their population.
  - **One-third of all seats** (including chairperson positions) for **women**.
- **Financial Empowerment:** Each state must constitute a **State Finance Commission (SFC)** every five years to recommend principles for:
  - Distribution of state revenues between the state and Panchayats,
  - Grants-in-aid, and
  - Measures to strengthen PRI finances.
- **Devolution of Powers and Responsibilities:** State legislatures are empowered to endow PRIs with **functional authority over 29 subjects** listed in the **Eleventh Schedule**—covering agriculture, health, education, and social welfare—promoting **decentralized planning and local development.**
- **Bar on Judicial Interference:** The Act prohibits courts from questioning laws concerning the **delimitation of constituencies** or **allocation of seats** for Panchayat elections. Only election petitions under state law can challenge results.



PANCHAYATI RAJ: A TIMELINE

What are the Key Challenges Faced by Panchayati Raj Institutions in India?

- **Incomplete Functional Devolution:** The **73rd Constitutional Amendment** mandates the **devolution of 29 subjects** listed in the **Eleventh Schedule** to **PRIs**.
  - According to the **2022 Ministry of Panchayati Raj** report titled *"Status of Devolution to Panchayats in States,"* **functional devolution**

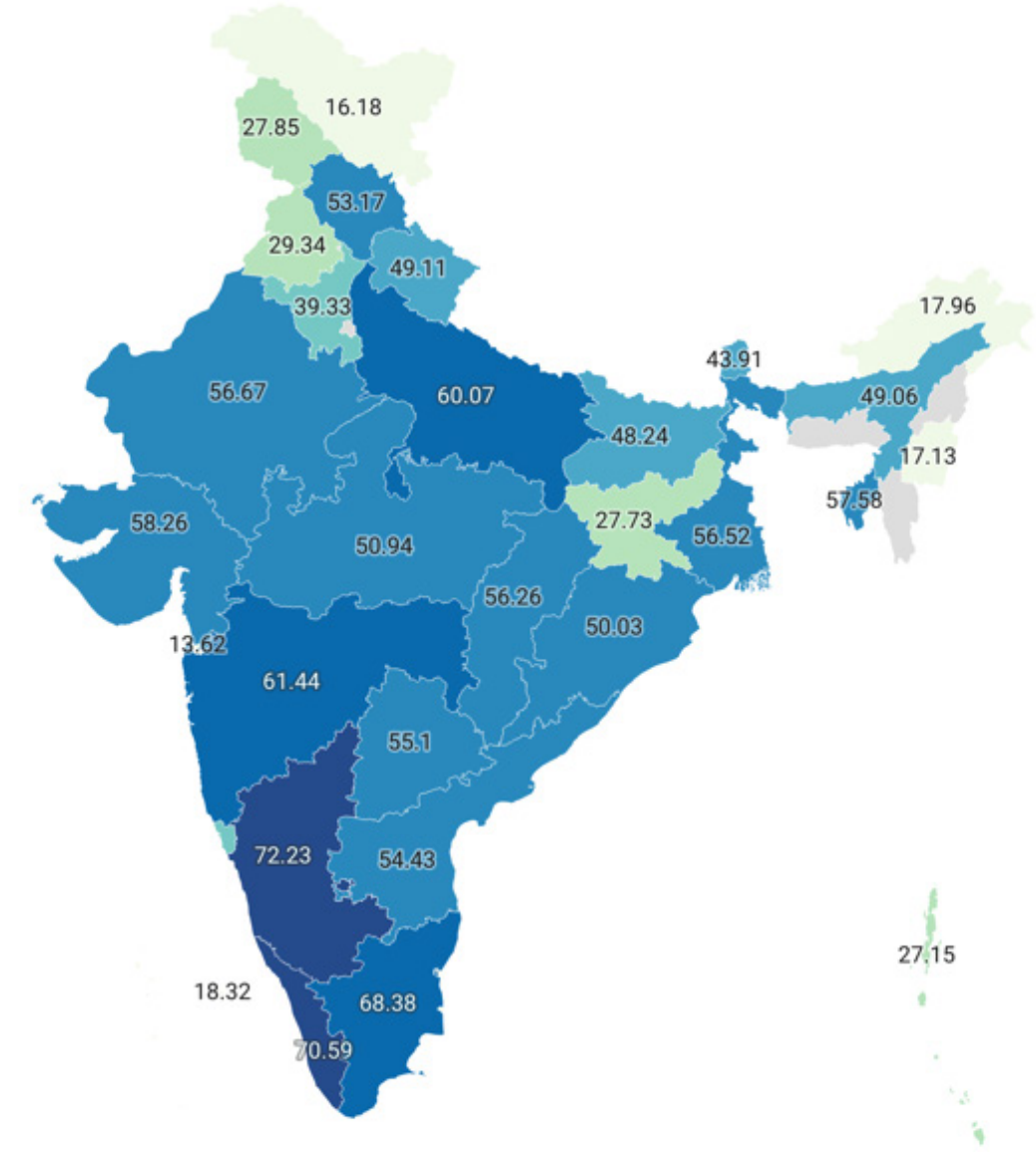
has **declined** from **35.34% to 29.18%**, indicating that a significant number of **Panchayats** still **lack control** over **essential core services**, thereby **limiting effective governance** and **accountability** at the **local level**.

- Many important sectors, such as **rural electrification** and **vocational training**, remain under **state-level control**, limiting the PRIs' ability to govern comprehensively and diminishing **local accountability**.

- **Fiscal Dependence and Financial Constraints:** Despite increased transfers under the **15th Finance Commission (₹2.36 lakh crore for 2021–26)**, PRIs suffer from **financial dependence** on the **state and central governments**.
  - **Panchayats** generate only about **1% of their revenue** through **local taxes**, reflecting minimal **fiscal autonomy**.
  - The **majority of their income** comes from **grants** — approximately **80% from the Central Government** and **15% from State Governments**, underscoring their **high dependency on external funding** for local development.
  - Delays in fund flow through schemes like **MGNREGA** and **Finance Commission grants** weaken planning and execution.
  - **Centrally sponsored schemes** often **bypass PRIs** or run parallel to them, creating **overlapping avenues** for **rural development funds**.
    - **PM-KISAN** transfers cash directly to beneficiaries, minimizing **PRI involvement** in identification and delivery, which reduces their role to mere implementers, eroding their **political legitimacy** and **capacity for local planning**.
- **Sarpanch Pati Phenomenon and Gender Marginalization:** Though **women hold about 43%** of PRI seats nationally, **patriarchal norms** often inhibit their substantive participation.
  - The **'Sarpanch Pati' phenomenon**—where **male relatives unofficially control women elected representatives**—remains widespread, particularly in states like **Uttar Pradesh** and **Bihar**.
  - This severely undermines the **constitutional goal of women's empowerment** and **participative democracy**.
- **Declining Gram Sabha Participation: Gram Sabhas** are constitutionally the **highest decision-making bodies** at the village level, but **irregular meetings**, **low turnout**, and **social exclusion** of marginalized groups dilute their democratic potential.
  - Participation is often restricted by **caste divisions** and **gender biases**, limiting the effectiveness of **participatory governance mechanisms**.
    - According to the **National Council of Applied Economic Research (NCAER) survey**, only **13% of villagers** on average attended **Gram Sabha meetings**, reflecting **limited citizen participation** in grassroots governance.
    - Notably, **men's attendance (21%)** was nearly **three times higher** than that of **women (7%)**, highlighting a significant **gender gap in local political engagement**.
  - Digital platforms like **eGramSwaraj** and **Panchayat NIRNAY** have improved transparency, but adoption is uneven across states.
- **Capacity Gaps & Bureaucratic Hurdles:** Many PRIs lack **basic infrastructural facilities** such as **office buildings**, **internet connectivity**, and **trained support staff**.
  - **Administrative personnel shortages** lead to bottlenecks in **planning, budgeting, and scheme implementation**.
  - The **Rashtriya Gram Swaraj Abhiyan's capacity-building efforts** improve this, but coverage is still limited.
  - PRIs are frequently subject to **political manipulation** by **state and party actors**, undermining their **autonomy**.

- **Bureaucratic dominance** through **Panchayat secretaries** and **district officials** restricts elected representatives' **decision-making**.
- **Parallel institutional structures**, like **District Rural Development Agencies (DRDAs)**, siphon **resources and authority** away, leading to **administrative inefficiencies** and **accountability gaps**.

How states fared on the devolution index in 2024

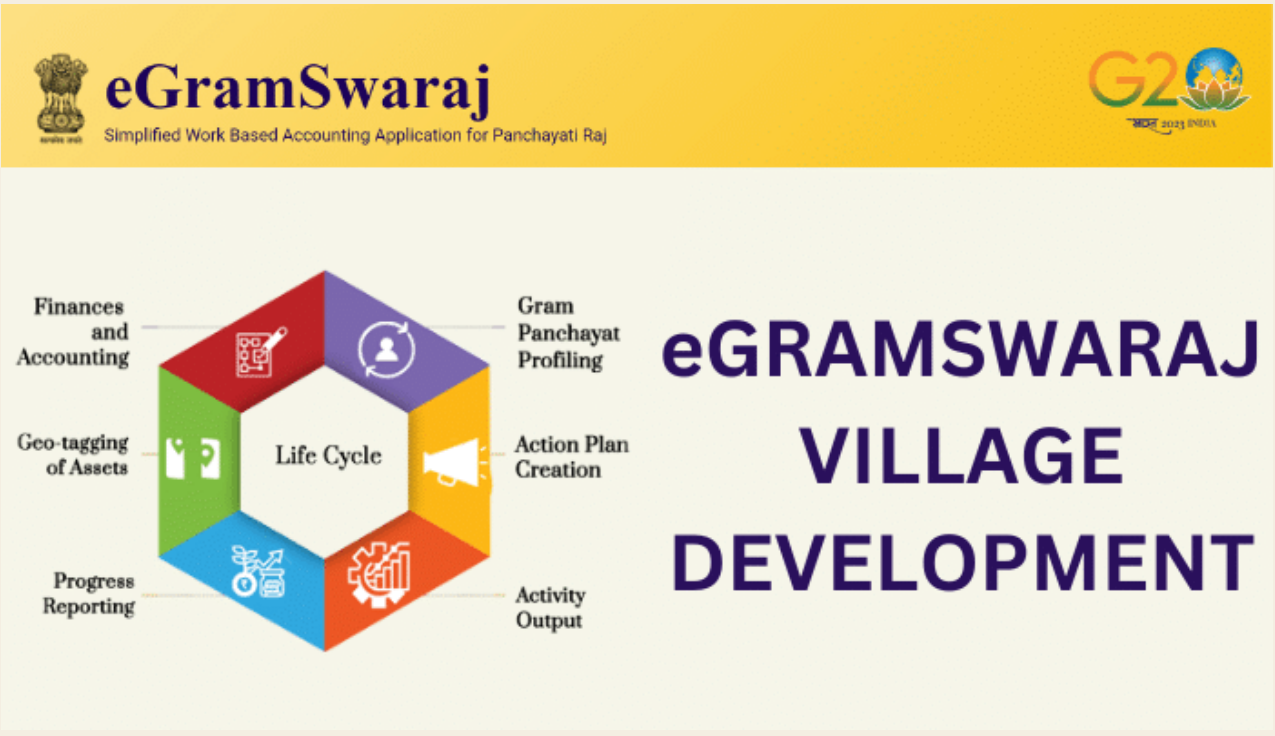


Note: Data not available for grayed out states

Source: Ministry of Panchayati Raj • Map data: © OSM • Created with Datawrapper

What are the Key Government Initiatives Driving Digital Transformation in Gram Panchayats?

- SabhaSaar: An **AI-powered meeting summarizer** launched in **2025** to create **accurate, real-time minutes** of **Gram Sabha meetings**, enhancing **transparency** and **efficiency**.
- SVAMITVA Scheme: Uses **drone and mapping technology** to provide **legal landownership documents** to **rural households**, improving **land management**, **dispute resolution**, and **revenue collection**.
- BharatNet: Launched in **2011**, BharatNet aims to **connect all Gram Panchayats with high-speed internet**, with over **2.14 lakh Panchayats already linked**, supporting **e-education**, **health**, and **governance services**.
- eGramSwaraj: A **comprehensive platform** for **planning**, **budgeting**, and **monitoring Panchayat activities**, adopted by over **2.7 lakh Panchayats**, **streamlining local governance**.
- Meri Panchayat App: Enables **citizens to access Panchayat data**, **track schemes**, and **communicate directly** with their **elected representatives**, promoting **transparency** and **participation**.
- Gram Manchitra GIS Tool: Supports **geo-spatial planning** for **development projects**, **asset management**, and **evidence-based decision-making**, improving **rural planning**.
- **Recognition and Awards**: The **National Awards for e-Governance 2025** recognise **grassroots innovations**, with over **1.45 lakh entries**, emphasising the **growing digital momentum** at the **village level**.



What Comprehensive Measures are Required to Empower Panchayati Raj Institutions (PRIs) in India?

- **Full Devolution of Powers, Functions, and Functionaries (3Fs):** States must fully devolve the **29 subjects under the Eleventh Schedule** to **PRIs**, as mandated by the **73rd Amendment**.
  - Full **functional devolution** enables PRIs to take **autonomous decisions** and plan **local development**.
  - According to the 2nd Administrative Reforms Commission (ARC), there must be a **clear delineation of functions** for each **tier of local government** under every **subject-matter law.**

- **Kerala's decentralized governance model** exemplifies **effective functional devolution** with strong **Gram Sabhas**.

- **Enhance Financial Autonomy and Resource Mobilization:** The government should empower **PRIs** by enabling them to generate significant **Own Source Revenues (OSR)** through enhancing **tax collection mechanisms**, **user fees**, and **local levies**.
  - Implement technological solutions like the **Samarth Panchayat portal** for better **revenue management**.
  - **Administrative decentralization** must strengthen and **privatize certain functions** to reduce **bureaucratic red tape**.
    - The **2nd ARC** also advised that **state governments should encourage local bodies to outsource specific functions** to **public or private agencies**, wherever appropriate, by providing **enabling guidelines and institutional support**.
- **Strengthen Gram Sabhas and Citizen Participation:** **Revitalising Gram Sabhas** through **awareness campaigns** and legally mandating **regular meetings** ensures **community involvement** and **accountability**.
  - **Digitally recording Gram Sabha proceedings** using **AI tools** like **SabhaSaar** enhances **transparency** and **documentation**.
  - **Maharashtra's success** in using **digital tools** to boost **governance transparency** during the pandemic is illustrative.
- **Expand Capacity Building and Professional Development:** Scaling the **Rashtriya Gram Swaraj Abhiyan (RGSA)** to provide comprehensive **training** on **governance**, **financial management**, and **digital literacy** to all **PRI representatives** is essential.
  - The state government should institute **full-time, professionally trained Panchayat secretaries** to bridge **administrative gaps** and promote **technical efficiency**.
  - **Independent and well-resourced State Election Commissions (SECs)** should conduct **timely, free elections** insulated from **political influence**.
  - Regular **audits** and **vigilance committees** with **citizen involvement** should monitor **PRI functions** to deter **corruption** and **misuse of power**.
    - In **2017**, **Meghalaya** became the **first Indian state** to mandate **social auditing** for **welfare schemes**, with the enactment of the **Meghalaya Community Participation and Public Service Social Audit Act**.
    - The Act mandates the implementation of **social audits** for over **20 welfare schemes**, including **Pradhan Mantri Awas Yojana - Gramin**, **National Social Assistance Programme**, and **National Food Security Act**.
- **Promote Social and Digital Inclusion with Safeguards:** Address the **'Sarpanch Pati' phenomenon** by enforcing **strict legal sanctions** and **sensitisation training** for **elected women members**.*(**MoPR partnered with the "Panchayat" web series to raise awareness on gender equality and Panchayati governance via YouTube which is a significant step in the right direction.)***
  - **Model Youth Gram Sabha initiatives** should be expanded to nurture **democratic engagement** of **women and youth**, ensuring **lasting social inclusion**.
  - **Leverage Digital Governance and Data-Driven Planning with the** adoption of platforms like **eGramSwaraj**, **SVAMITVA** for **property mapping**, and **Gram Manchitra** for **spatial planning** to aid **transparent**, **evidence-based governance**.
  - Integrate **procurement portals** such as GeM at the local level to promote **efficiency** and reduce **corruption**.

Conclusion:

As **Mahatma Gandhi** said, ***"The soul of India lives in its villages."*** With **68.84% of Indians** residing in **rural areas**, achieving the Sustainable Development Goals (SDGs) requires empowering **Panchayati Raj Institutions (PRIs)**. The government must ensure **full devolution of**

powers and funds, enhance **financial autonomy**, and strengthen **capacity building** through **Rashtriya Gram Swaraj Abhiyan**. Leveraging **digital tools** like **eGramSwaraj**, revitalising **Gram Sabhas**, and promoting **women's participation** will drive **inclusive**, **democratic**, and **sustainable rural development**.

Reinventing Forest Conservation Efforts in India

This editorial is based on "India's forests hold the future", which was published in The Hindu on 05/11/2025. The article underscores the vital role of India's forests in maintaining ecological balance, climate resilience, biodiversity conservation, and sustainable livelihoods. It calls for stronger community participation, innovative conservation strategies, and a robust policy framework to ensure a sustainable and resilient environmental future.

Tag: GS Paper - 3, Conservation, Issues Relating to Development, Management of Social Sector/Services, Forest Resources

India stands at a **critical juncture** where the ambitions of **economic growth** and **ecological sustainability** must converge. With the **Green India Mission's target** to restore **25 million hectares of degraded forests by 2030**, the focus has shifted from **mere tree planting** to fostering **ecological resilience**. However, challenges such as **declining forest health due to climate change**, **limited community participation**, and **underutilization of funds** continue to **inhibit progress**. India must therefore prioritise **community involvement**, **native species restoration**, **capacity building**, and **innovative financing mechanisms** to secure the **future of its forests** and fulfill its **climate commitments**.

What are the Key Drivers Behind India's Evolving Forest Conservation Strategy?

- **Enhanced Focus on Increasing Forest and Tree Cover:** According to the **India State of Forest Report 2023 (ISFR)**, India's **total forest and tree cover** stands at **827,357 sq km**, covering **25.17% of the geographic area**.
  - Notably, **forest cover grew by 156 sq km** and **tree cover by 1,289 sq km** from **2021 to 2023**.
  - States like **Chhattisgarh, Odisha, Uttar Pradesh, and Rajasthan** have led gains in forest area, reflecting effective **afforestation and restoration efforts**.
  - **19 States/UTs** have **forest cover above 33%** of their area; **Mizoram, Lakshadweep, Andaman & Nicobar Islands, Arunachal Pradesh, Nagaland, Meghalaya, Tripura, and Manipur** have **forest cover above 75%**.
- **Carbon Sequestration and Climate Goals:** India's **forests act as vital carbon sinks**, currently **absorbing about 30.43 billion tonnes of CO_2 equivalent**, reflecting an **increase of 2.29 billion tonnes since 2005**.
  - This growing **carbon absorption capacity** plays a pivotal role in achieving **India's commitments under the Paris Agreement**.
  - To further enhance this capacity, the government has launched initiatives such as the **Green India Mission (GIM)-Updated Framework**, which aims to **restore 25 million hectares of degraded forest and non-forest land by 2030**, marking a **significant scale-up of earlier restoration targets**.
  - This **ambitious restoration effort** directly supports India's **climate pledge** to **create an additional carbon sink** capable of **absorbing up to 3.39 billion tonnes of CO_2 equivalent by 2030**, reaffirming the nation's commitment to **sustainable land management**, **ecological restoration**, and **long-term climate resilience**.
- **Government-Backed Afforestation and Restoration:** The **Green India Mission (GIM)** has allocated over **₹900 crore** to states for **planting and restoration work** on **1.55 lakh hectares**, including focused efforts on **mangrove rehabilitation** through the **MISHTI scheme**, which has restored over **22,500 hectares of coastal land**.

- The National Afforestation Programme (NAP), launched in **2000** and now merged with the **Green India Mission (GIM)**, promotes **people's participation** in **tree plantation and ecological restoration** of degraded forests.
  - With an **investment of about ₹3,982 crore**, **NAP** has facilitated **afforestation over more than 2 million hectares** across States and UTs, including a **sub-mission focused on enhancing tree cover in urban and peri-urban areas**.
- National Forest Policy mandates a goal of a **minimum one-third of land under forest/tree cover** nationally.
- The **'Ek Ped Maa Ke Naam'** campaign inspired **millions** nationwide to **plant trees in honour of their mothers**, resulting in **over 1.4 billion seedlings planted**.

Expansion and Strengthening of Wildlife Corridors: To maintain **biodiversity** and **wildlife connectivity**, critical corridors such as the **Kaziranga-Karbi Anglong Corridor (Assam)**, **Rajaji-Corbett Tiger Corridor (Uttarakhand)**, and **Western Ghats corridors** have been expanded and strengthened.

- These corridors protect endangered species like **tigers, elephants, Nilgiri Tahr, and sloth bears**, supported by **reforestation with native species** over thousands of hectares.

Community Participation and Livelihood Enhancement: Recognising the role of **forest-dependent communities**, especially **tribal populations**, India promotes **Joint Forest Management Programs** and the Pradhan Mantri Van Dhan Yojana (PMVDY).

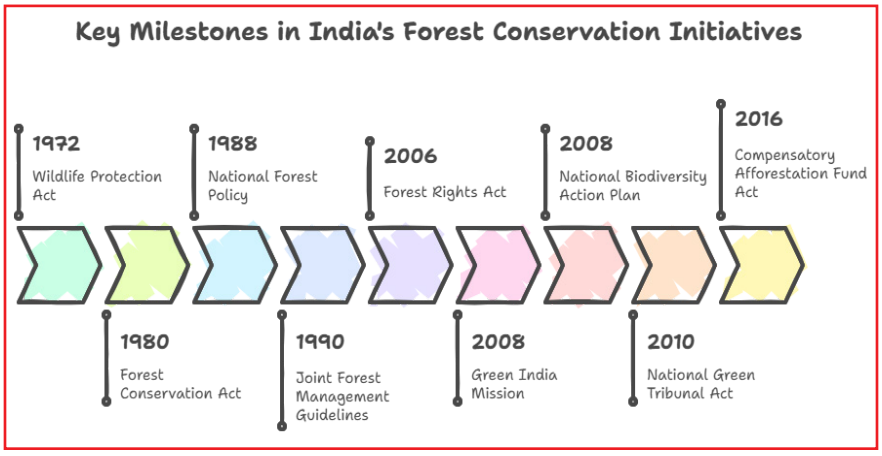
- **PMVDY** enhances livelihoods by supporting **300 tribal Self-Help Groups (SHGs)** through **skill development, infrastructure support, and market linkages** for Minor Forest Produce (MFP).
- This **participatory approach** improves **local stewardship** and **poverty alleviation**.

Digitisation and Technology-Driven Governance: The **Ministry of Environment, Forest and Climate Change (MoEFCC)** has promoted the **digitisation of forest boundaries** across **25 states and union territories**, enabling better **monitoring and planning**.

- Advanced **satellite-based fire alert systems** and **geospatial monitoring** underpin **real-time forest management**, while data from **ISFR** guides **evidence-based policymaking**.
- **Madhya Pradesh** has become the **first state in India** to implement an **AI-based** Real-Time Forest Alert System (RTFAS) on a **pilot basis**, enabling **active forest management**, **early detection of deforestation**, and **rapid response to illegal activities and forest fires**.

Forest Fire Prevention and Management: The government has implemented the Forest Fire Prevention & Management Scheme, incorporating modern **remote sensing** and **GIS technologies**, operated by the **Forest Survey of India (FSI)**.

- As a result, **forest fire incidents** have decreased from **223,333 in 2021-22** to **203,544 in 2023-24**, improving **forest health** and reducing damage to **biodiversity** and **rural livelihoods**.



What is the Current Status and Classification of Forests in India?

- **Definitions by Forest Survey of India (FSI):**
  - **Forest Cover:** All lands with **tree canopy density of 10% or more**, larger than **one hectare**, irrespective of ownership or species, including **natural forests, plantations, orchards, bamboo, and palm**.
  - **Tree Cover:** Trees **outside recorded forest area**, in **patches less than one hectare**, such as trees in **urban areas, farms, and avenues**.
  - **Recorded Forest Area (RFA):** Land **officially notified and recorded as forest** under government acts/survey records.
- **Classification of Forests:**
  - **Based on Canopy Density (FSI classification):**
    - **Very Dense Forest:** Canopy density **> 70%**
    - **Moderately Dense Forest: 40–70%**
    - **Open Forest: 10–40%**
    - **Scrub: < 10% canopy**
  - **Based on Vegetation Types (Champion and Seth revised classification):**
    - Tropical Moist Deciduous
    - Tropical Dry Deciduous
    - Montane Subtropical
    - Montane Temperate
    - Sub-Alpine
    - Alpine
- **Key Findings from ISFR 2023:**
  - **Total forest and tree cover** is **827,357 sq km (25.17%)** of India's geographical area.
    - **Forest Cover: 715,343 sq km (21.76%)**
    - **Tree Cover: 112,014 sq km (3.41%)**
  - **Forest and tree cover increased** by **1,446 sq km** since 2021, with maximum gains in **Chhattisgarh (684 sq km)**, **Uttar Pradesh (559 sq km)**, **Odisha (559 sq km)**, and **Rajasthan (394 sq km)**.
  - **The largest forest cover increase** was recorded in **Mizoram (242 sq km)**, **Gujarat (180 sq km)**, and **Odisha (152 sq km)**.
  - **Major decreases were** seen in **Madhya Pradesh (612 sq km)**, **Karnataka (459 sq km)**, **Ladakh (159 sq km)**, and **Nagaland (125 sq km)**.
  - **India's carbon sink** from forest and tree cover is **30.43 billion tonnes of CO_2 equivalent**, an increase of **2.29 billion tonnes since 2005**.
  - **Soil health** has improved, with **soil organic carbon** rising from **55.85 to 56.08 tonnes per hectare**, enhancing soil structure.
  - **Biotic pressure** on forests (**grazing, illicit felling, fire**) has reduced from **31.28% in 2013 to 26.66%**, indicating improving forest health.
  - **Bamboo bearing area** is estimated at **1,54,670 sq km**, increasing by **5,227 sq km** since 2021.
  - **Mangrove cover** stands at **4,992 sq km**, showing minor fluctuations with **Gujarat** seeing a decrease and **Andhra Pradesh** and **Maharashtra** showing increases.

What are the Major Challenges Undermining India's Forest Conservation and Management Efforts?

- **Deforestation and Forest Land Diversion:** India continues to face **net forest loss** due to **diversion**

of forest land for **infrastructure** and **industrial projects**.

- The **MoEFCC** has **approved the diversion of 1,73,984.3 hectares of forest land** for **non-forestry purposes** between **2014–15 and 2023–24**.
- Between **April 1, 2021, and March 31, 2025**, a total of **78,135.84 hectares of forest land** were **approved for diversion to non-forest purposes**.
  - Among the states, **Madhya Pradesh** recorded the **highest diversion** with **17,393.65 hectares**, followed by **Odisha (11,033.08 ha)**, **Arunachal Pradesh (6,561.47 ha)**, **Uttar Pradesh (5,480.43 ha)**, and **Chhattisgarh (4,092.01 ha)**.
- These figures highlight the **intensifying developmental footprint** on India's forests, emphasising the need for **stricter ecological safeguards** and **sustainable land-use planning**.

Inadequate Implementation of Forest Rights: Several years after the implementation of **the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (FRA)** — introduced in **January 2008** — **forest-dwelling communities still face major challenges in securing their legal rights**.

- To date, **only three states** have made **notable progress in recognising Community Forest Resource (CFR) rights**, with **Maharashtra** standing out as **the only state where these rights have been effectively operationalised**.
- This reflects the **slow and uneven implementation** of the FRA across India, undermining its core objective of **empowering forest-dependent communities** and promoting **inclusive forest governance**.
- A case study in **Budaguda Gram Panchayat, Odisha**, shows how denial of community rights led to conflict with forest authorities.
- **Illegal timber extraction** and **encroachments** continue to deplete forests. States like **Madhya Pradesh** and **Chhattisgarh** have witnessed surges in **unlawful logging** and a **146% rise in encroachments** in recent years.

Monoculture Afforestation and Biodiversity Loss: Large-scale **monoculture plantations** of **non-native species** such as **eucalyptus** and **teak** are reducing **biodiversity** and degrading **soil fertility**.

- The **India State of Forest Report (ISFR) 2023** highlights that much of the recent increase in forest cover comes from **plantation forests**, not **natural regeneration**.
- This reduces **ecosystem resilience** to **pests** and **climate variability**, particularly in **central India**.
- The spread of **invasive species** like **Lantana camara**—which now covers **40% of tiger reserves**—and **Prosopis juliflora** disrupts **native vegetation** and **wildlife habitats**.
- States such as **Karnataka** and **Tamil Nadu** struggle with widespread infestations, reducing **fodder availability** and complicating **restoration**.

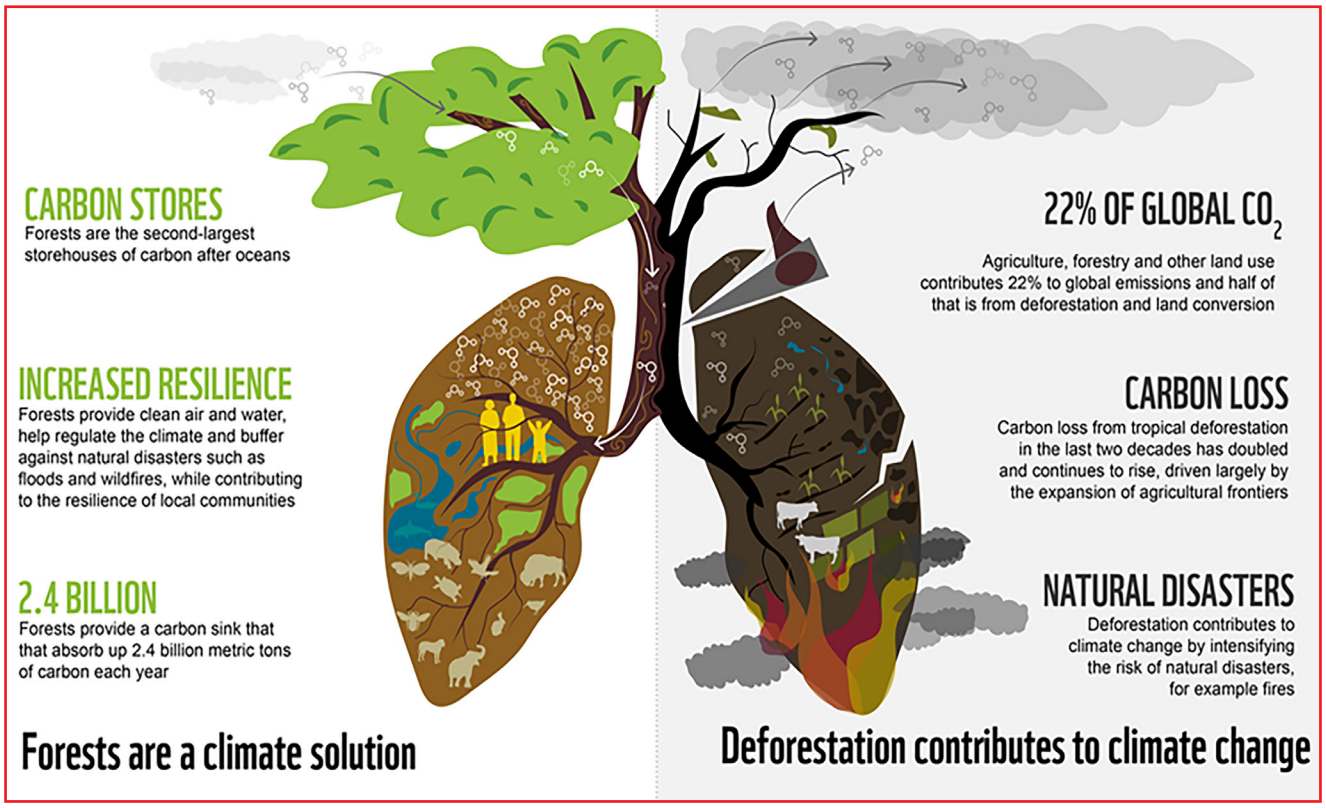
Human–Wildlife Conflicts and Habitat Fragmentation: Habitat loss and **fragmentation** from development projects push wildlife into **human settlements**, increasing **conflict incidents**.

- Between **2019 and 2024**, approximately **2,829 people lost their lives in elephant attacks** across India, with **Odisha recording the highest number of fatalities**.
- In **2023–24**, a total of **121 elephants died** in India — including **94 due to electrocution**, **9 from poaching**, **1 from poisoning**, and **17 in train accidents**.
- Between **2019 and 2024**, over **2,727 human deaths** occurred due to **elephant attacks**.
- States like **Assam** are using **AI-based early warning systems** and **community vigilance groups** to reduce conflict, but **coexistence challenges** persist in **forest fringe areas**.

Climate Change and Increasing Forest Fires: Climate change has increased the **frequency and intensity of forest fires globally.**

- **Erratic rainfall** and **rising temperatures** exacerbate the vulnerability of **montane** and **dry deciduous forests**.

- Between **2001 and 2022**, the world lost approximately **126 million hectares of forest cover** due to **wildfires**, reflecting a **sharp surge in fire-induced forest loss** over the past two decades and highlighting the **growing impact of climate change and land-use pressures** on global ecosystems.
- **Forest fires** now account for nearly **44% of annual tree cover loss (2023–2024)** — almost **double** the share of around **26–29% recorded between 2001 and 2022**.
- Regions like the **Garhwal Himalaya** have seen repeated **wildfire incidents**, degrading **biodiversity**, **watersheds**, and **soil stability**, thus threatening **livelihoods**.
- Limited **funding**, **technical capacity**, and **community involvement** hinder effective control.



What are the Key Government Initiatives Undertaken for Forest Conservation and Management in India?

- **Green India Mission (GIM):** Part of the **National Action Plan on Climate Change (NAPCC)**, launched in **2015–16**, originally aimed to **expand forest and tree cover by 5 million hectares** and **improve another 5 million hectares** of degraded forest and non-forest land.
  - Focuses on **ecosystem services** like **carbon sequestration**, **water conservation**, and **biodiversity enhancement**.
- **Forest Fire Prevention & Management Scheme (FFPM):** A **centrally sponsored scheme** supporting **states and UTs** in **controlling forest fires**.
  - Employs **remote sensing**, **GPS**, **GIS**, and **satellite-based monitoring** for **real-time fire alerts**.
- **National Agroforestry Policy (2014):** Promotes **agroforestry** as a **sustainable land use practice** integrating **tree planting with crops**, enhancing **soil fertility**, **agricultural productivity**, and **farmer income**.
  - Focuses on **quality planting material** through **nurseries and tissue culture**; **ICAR-Central Agroforestry Research Institute (CAFRI)** provides **technical support and training**.

- Offers **market and economic incentives**, including **price guarantees** and **buy-back options**, to encourage **private sector participation**.

- **Pradhan Mantri Van Dhan Yojana (PMVDY):** Aims to **improve tribal livelihoods** through **sustainable management and value addition** of **Minor Forest Produce (MFP)**.
  - Establishes **Van Dhan Vikas Kendras (VDVKs)** — each with **300 members** from **15 Self-Help Groups (SHGs)** for **processing and marketing MFPs**.
- **Compensatory Afforestation Fund Management and Planning Authority (CAMPA):** Utilises **funds collected** from **forest land diversion** for **non-forest purposes** to carry out **afforestation** and **eco-restoration activities**.
- **International Big Cat Alliance (IBCA):** Launched by **India** as a **global platform** to protect the **seven big cat species** through **joint research**, **capacity building**, and **knowledge sharing** among **UN member states**.
  - Supports **tiger conservation corridors** and **biodiversity hotspots** vital for **ecological stability**.

What Effective Measures can be Adopted to Ensure Sustainable Forest Conservation and Management in India?

- **Strengthen and Modernise Legal Frameworks:** India should **rigorously enforce and update forest laws** such as the **Forest Conservation Act**, including the **Van (Sanrakshan Evam Samvardhan) Amendment Rules, 2025**, which **streamline forest land approvals**, **promote compensatory afforestation**, and **incorporate safeguards for critical mineral mining**.
  - These **legal enhancements** will **modernise forest governance** and **align with global climate and biodiversity goals**.
- **Empower Communities and Indigenous Peoples:** India must **decentralise forest governance** by fully implementing the **Forest Rights Act** to **recognise and empower forest-dependent communities**, particularly **tribal groups**.

- Through **participatory forest management**, **community stewardship** can **reduce illegal activities**, **improve biodiversity conservation**, and **enhance livelihoods**, reflecting **best practices** under the **UN Declaration on the Rights of Indigenous Peoples**.
- Massive campaigns like **'Ek Ped Maa Ke Naam'** demonstrate the power of **citizen engagement** in **forest conservation**.
  - India should bolster **formal environmental education** and celebrate the **International Day of Forests** annually to foster a **culture of stewardship** and **scientific curiosity**.

Prioritise Ecological Restoration with Native Species: India should **phase out monoculture plantations** in favour of **restoring native forests** and **diverse ecosystems**.

- The **Green India Mission's** focus on **mixed-species restoration** must expand across states, promoting **ecosystem connectivity** and **climate resilience** in line with the **UN Decade on Ecosystem Restoration**.
- The government must implement **targeted action plans** to **control invasives** like ***Lantana camara*,** which threaten **core tiger reserves** and other **critical habitats**.
  - Combining **scientific research** with **local knowledge**, these efforts will **restore native plant communities**, **enhance wildlife habitat quality**, and **maintain ecosystem balance** as per **global biodiversity targets**.

Integrate Agroforestry and Climate-Smart Farming Practices: India should fully implement the **National Agroforestry Policy** to encourage **sustainable land-use systems** that **improve productivity**, **sequester carbon**, and **provide alternate livelihoods**.

- Linking **agroforestry** with **millet cultivation** and **drought-resistant farming** supports **climate adaptation** and **food security** in **vulnerable regions**.
- India must **invest in climate-adaptive forest management**, including **fire danger rating systems**, **drought-tolerant species plantations**, and **ecosystem services improvement projects**.
  - These measures, supported by **international funding** and **cooperation** like the **World Bank-backed Ecosystem Services Improvement Project (ESIP)**, will make forests more resilient to climate extremes, fulfil **Paris Agreement commitments**, and secure vital carbon sinks.

Adopt Advanced Technology for Surveillance and Monitoring: Scaling up **real-time monitoring tools** such as **satellite imaging**, **drones**, **GPS**, and **AI** will enable **early detection of illegal logging**, **forest fires**, and **habitat encroachment**.

- The **Forest Survey of India's** use of **MODIS sensor data** for **forest fire alerts** is a positive example.
- **Light Detection and Ranging (LiDAR)** technology, widely used in countries like the **United States** and **Canada**, enables **precise 3D mapping of forest canopy**, **biomass estimation**, and **detection of forest degradation**.
  - Its **adoption in India** can significantly **complement satellite-based monitoring**, leading to **more accurate ecological assessments** and **data-driven forest management**.

Conclusion:

In ***"The Religion of the Forest,"*** **Rabindranath Tagore** beautifully observed that *"the forest teaches us enoughness- the principle of equity, showing how to enjoy nature's gifts without exploitation or accumulation."* To honour this ethos, India should focus on **integrating ecological restoration**, **empowering local and indigenous communities**, **leveraging advanced technology**, and **strengthening legal frameworks** for forest protection.

Rethinking Welfare Through Universal Basic Income

This editorial is based on "Redraw welfare architecture, place a universal basic income in the centre" which was published in The Hindu on 07/11/2025. The article brings into picture the idea of Universal Basic Income as a humane response to rising inequality and job insecurity, while stressing that its success hinges on prudent design and fiscal sustainability.

Tag: GS Paper - 3, Employment, GS Paper - 2, Government Policies & Interventions

As India grapples with **widening wealth inequality** unseen since colonial times, **automation-driven job displacement**, and a fragmented welfare system plagued by leakage and exclusion, **Universal Basic Income (UBI)** emerges not as a utopian fantasy but as an urgent policy imperative. By offering unconditional cash transfers to every citizen regardless of income or employment status, **UBI promises to cushion unemployment shocks, reward invisible care labor,** and restore dignity to millions trapped in gig economy precarity. However, critics caution that **UBI could strain public finances, fuel inflationary pressures, and potentially weaken the incentive to work if not carefully designed.** It may also divert resources from essential public goods like healthcare and education. Hence, while the moral and social case for UBI is compelling, **India must navigate its implementation prudently.**

What is Universal Basic Income?

- **About**: **Universal Basic Income (UBI)** is a social welfare proposal in which all citizens of a given population regularly receive a minimum income in the form of an **unconditional cash transfer**.
- **Features**:
  - **Universal:** It is paid to **all** citizens or residents within a specific jurisdiction, regardless of their employment status, income, or wealth.
  - **Unconditional:** It is provided **without any work requirements** or means tests (proving one's need for the payment).
  - **Periodic:** The payment is made on a **regular basis** (e.g., monthly), not as a one-time grant.
  - **Cash Payment:** It is delivered as **cash**, giving recipients the freedom to spend it as they see fit (rather than in-kind benefits like vouchers).

What are the Key Arguments in Favour of Universal Basic Income in India?

- **Superior Alternative to Fragmented Welfare Schemes:** UBI offers a **clean, transparent, and direct cash transfer,** effectively eliminating the massive exclusion errors and corruption that plague India's current complex web of **950+ centrally sponsored schemes.**
  - It reduces the **leakage and administrative overhead** associated with the **'in-kind' transfer system (like PDS),** ensuring the intended benefit reaches the poor directly via the digital infrastructure.
  - The **Economic Survey 2016-17** estimated food and fuel subsidies alone cost about **3% of GDP**.
    - A UBI delivered through the **JAM (Jan Dhan-Aadhaar-Mobile) trinity offers a digitally verifiable solution,** converting bureaucratic waste into a direct social dividend.
- **Essential Insurance Against Economic Shocks and Crises:** UBI acts as a **permanent, automatic stabilizer**, providing an immediate financial cushion to vulnerable populations during unforeseen crises like the **Covid-19 pandemic** or climate disasters.
  - It avoids the administrative delays and political targeting debates that characterize *ad hoc* relief measures, ensuring rapid aid when the formal economy grinds to a halt.
  - During the **Covid-19 lockdowns**, the need for a safety net was exposed, with **NITI Aayog** noting that the pandemic disproportionately affected informal sector workers (over **90% of the workforce**).

- A foundational UBI provides the **economic security** necessary for migrant workers and the self-employed to survive sudden income loss.

- **Enhanced Gender Equity and Women's Economic Agency:** Providing an unconditional, individual cash transfer to every adult, especially **women**, significantly enhances their **financial autonomy and bargaining power within the household.**
  - It implicitly recognizes the enormous, yet uncompensated, value of **unpaid care work**, a critical factor in India's low female labor force participation.
  - The **National Sample Survey (NSS)** data indicates women spend an average of **299 minutes a day** on unpaid domestic services compared to just **97 minutes for men.**
  - Pilots, like the **SEWA-UNICEF Madhya Pradesh** study, showed that cash transfers empowered women to invest in livestock and start micro-enterprises, increasing their say in economic decisions.
- **Stimulus for Grassroots Entrepreneurship and Innovation:** By ensuring a basic income floor, UBI allows the poor to take **calculated economic risks**, fostering greater investment in productive assets, skill development, and small-scale business ventures.
  - It serves as a **de-facto seed capital**, liberating people from the constant struggle of subsistence and the need to accept exploitative work.
  - Moreover, with a **guaranteed income stream**, individuals gain the freedom to pursue creative and entrepreneurial ideas that might not yield immediate returns but contribute to long-term community development and innovation.
- **Investment in Human Capital-Health and Education:** Unconditional cash flow enables poor families to make **proactive investments** in the long-term well-being of their children and themselves, moving expenditure away from immediate consumption towards health, nutrition, and schooling.
  - It replaces the **anxiety of poverty with the dignity of choice**, which has proven mental health benefits.
  - The **MP pilot** showed a dramatic increase in family expenditure on health and education.
    - Additionally, the proportion of children with **normal weight-for-age increased from 39% to 59%** in pilot villages, indicating improved nutrition and health outcomes.
- **Mitigation of Job Displacement from Automation and AI:** As India's economy modernizes, the threat of **technological unemployment** in sectors like manufacturing, logistics, and IT-enabled services, which rely heavily on routine tasks, poses a major risk to mass employment.
  - UBI can serve as a **Citizen's Dividend**, distributing the productivity gains from automation back to the populace.
  - A **NITI Aayog** report projects gig economy workers, who lack traditional benefits, to grow to **23.5 million by 2029-30**, and the threat of automation is real for formal jobs.
    - UBI is presented as a futuristic mechanism to manage this **"jobless growth"** by **de-linking income from work, preventing mass precarity.**

What are the Key Arguments Against Universal Basic Income in India?

- **Fiscal Unsustainability and Crowding Out Essential Public Services:** A UBI set at a level meaningful enough to alleviate poverty would impose an **unprecedented and unsustainable fiscal burden** on the government exchequer, demanding massive tax increases or drastic cuts to other vital public spending.
  - India already struggles with a high combined debt (Centre and States) that stood at over **81% of GDP in 2022-23**, **limiting borrowing space.**
  - The **Economic Survey 2016-17** estimated a poverty-line-level UBI would cost approximately **4.9% of GDP (at 2016 prices).**

- Diverting such a large share of the budget would fatally crowd out critical long-term public investments in education, healthcare, and physical infrastructure.

- **Disincentive to Work and Damage to the Labor Market:** Providing an unconditional income floor could significantly **reduce the labor participation rate**, particularly among marginal or low-wage workers in the agricultural and construction sectors, fostering a culture of dependency.
  - This effect would be most pronounced in the informal economy, which accounts for over **90% of India's workforce**, potentially leading to labor shortages and wage distortion.
  - Evidence from global trials, such as the **Negative Income Tax (NIT) experiments** in the US, showed a decline in hours worked, particularly among secondary earners and mothers.
  - India's **urban** Worker-Population Ratio (WPR) for ages 15+ was already low at **46.8% (April-June 2024)**; an assured income might further weaken the incentive to seek formal or steady employment.
- **Risk of Demand-Pull Inflation and Erosion of Real Value:** Injecting a massive, continuous stream of unconditional cash into the economy, especially without a corresponding increase in the supply of goods and services, carries a severe risk of **demand-pull inflation**.
  - This inflationary pressure would disproportionately affect essential items like food and housing, **negating the real purchasing power** of the UBI for the poor.
  - **India's** Consumer Price Index (CPI) inflation was already elevated, reaching **5.49% in September 2024**, showcasing existing supply side rigidities.
    - If UBI increases the effective demand for goods like rent and food in localized, poorly connected rural markets, it could lead to price spirals that leave the poor no better off in real terms.
- **Ethical and Equity Concerns over True Universality:** The **'Universal'** nature of UBI means distributing scarce public resources to the non-poor and even the wealthy, creating a significant **opportunity cost** in a highly unequal nation.
  - Critics argue that this **non-targeted approach** is an inefficient and unethical use of funds that should be strictly focused on the most vulnerable groups.
  - India is one of the world's most unequal nations, where the **top 10% own over 77% of the total national wealth**, according to some estimates.
    - Providing the **same cash transfer** to this group as to an impoverished landless laborer is fundamentally regressive and wastes resources that could have funded crucial development or targeted poverty alleviation schemes.
- **Undermining Existing, Targeted Welfare Schemes:** UBI is often proposed as a replacement for fragmented existing subsidies and welfare schemes, but eliminating programs like the Public Distribution System (PDS) or **MGNREGA** could severely harm specific, highly vulnerable populations.
  - These in-kind and work-based schemes are often superior for ensuring basic entitlements and stabilizing minimum wages.
  - **MGNREGA** provides a **statutory right to employment**, stabilizing rural wages and acting as a crucial safety valve for **millions of registered workers** during economic downturns.
    - Replacing this job-guarantee scheme with a small UBI cash transfer could strip the most vulnerable of their current, **non-negotiable entitlements to food (PDS) or job security (MGNREGA).**
- **Implementation Challenges and Exclusion in the Last Mile:** Despite the rise of the **JAM (Jan Dhan-Aadhaar-Mobile)** infrastructure, significant last-mile operational hurdles, including low digital literacy and weak banking penetration in remote areas, remain.

- A sudden national UBI rollout would face high **exclusion errors**, leading to a fresh wave of administrative corruption and denial of benefits to those most in need.
- Reports have shown that **Aadhaar-linked payment failures** and inactive **Jan Dhan account**s continue to plague Direct Benefit Transfer (DBT) schemes, with authentication failures reportedly as high as **51% (Dvara Research).**
- These technological and access gaps make the smooth and universal delivery of UBI extremely challenging for India's massive and diverse population.

- **Misallocation and Spending on "Temptation Goods":** A key argument against unconditional cash is the concern that beneficiaries, especially men within the household, might **misspend the UBI** on non-essential or harmful **"temptation goods"** like **alcohol, tobacco, or gambling,** rather than on nutrition, education, or productive investments.
  - This risk is greater if the **UBI is not credited directly to women's accounts.**
  - While many pilot studies found that **most cash was spent rationally,** the public perception and political opposition remain strong based on this concern.
    - **Deaths and diseases** due to tobacco use already deprive the Indian economy of an estimated **INR 1773.4 million annually, which is over 1% of the GDP, critics argue that this can be exacerbated by UBI.**

What Steps can India take to Make Universal Basic Income a Viable Policy for the Future?

- **The Incremental 'Welfare Floor' Approach (MPBI):** Instead of launching a full UBI immediately, India should adopt a **Modified and Phased Basic Income (MPBI)** strategy, starting with a non-poverty-line **Universal Basic Floor**.
  - This transfer, set at a fiscally manageable 1-1.5% of GDP, would act as a structural base, providing a minimum common safety net for *all* citizens, while keeping existing critical schemes like PDS and MGNREGA intact initially.
  - This low-cost, universal foundation minimizes exclusion errors while allowing time for **fiscal rationalization** to generate the resources for subsequent increases.
- **"Quasi-Universal" Focusing on Vulnerable Demographics:** To reconcile the high cost of true universality with the goal of poverty reduction, the initial MPBI rollout must prioritize the most vulnerable, identifiable groups that have the highest social returns.
  - This means adopting a **'universal within a category'** approach, guaranteeing the basic income to all **women**, the **elderly (60+)**, and **persons with disabilities**.
  - This targeted universality is politically feasible, fiscally containable, and maximises impact on **gender equity** and social security.
- **Mandatory, Transparent Subsidy Rationalization Fund:** To secure the financial backing for UBI, the government must establish a **Dedicated UBI Fund** solely financed by the **consolidation and transparent withdrawal** of demonstrably inefficient, non-merit subsidies (like certain tax exemptions, power, and high-income fuel subsidies).
  - This fund must operate with **legislative ring-fencing**, making its revenues immune to being diverted for other budgetary uses and creating a clear mechanism for its annual replenishment and growth.
- **UBI as a Conditional Replacement for Inefficient Schemes:** The replacement of existing schemes should be **gradual, conditional, and evidence-based**, not an immediate political fiat.
  - UBI must only replace those centrally sponsored schemes identified by rigorous, third-party **Social Audits** to have high leakage, corruption, and low outcome efficacy, while **retaining and strengthening** high-impact programmes like the **National Food Security Act (PDS) and MGNREGA** until UBI reaches a viable, **poverty-line equivalent value**.

- **Strengthening the JAM+ Infrastructure for Error-Free Delivery:** The feasibility rests entirely on improving the digital delivery infrastructure, extending beyond the current **JAM (Jan Dhan-Aadhaar-Mobile) Trinity** to a robust **JAM+ system**.
  - This involves mandatory expansion of **digital literacy and banking infrastructure** in remote and tribal areas, and implementing a real-time **Aadhaar/Biometric Failure Grievance Redressal** mechanism with alternative **(e.g., OTP or manual)** withdrawal options to eliminate last-mile exclusion errors for the digitally marginalized.
- **Fiscal Federalism and Cooperative Funding Mechanism:** Given that both the Union and State governments operate welfare schemes, UBI implementation requires a **cooperative federal mechanism** to share the fiscal load and political risk.
  - A **Joint UBI Commission** should be established to mandate a clear **cost-sharing formula** (e.g., 60:40 or 50:50) between the Centre and States, ensuring State-level schemes are integrated without disrupting state finances or creating political conflicts over revenue allocation.
- **Legally Entrenching UBI as a Citizens' Social Right:** To ensure political commitment and prevent the future rolling back of the scheme, the MPBI should be legally established, potentially through a new **Social Security Act**, as an **entitlement** rather than a discretionary dole.
  - This legal embedding elevates the UBI above transient political cycles, guaranteeing its permanence and allowing citizens to hold the government accountable for the **adequacy and regularity** of the transfer, ensuring long-term policy stability.

Conclusion:

Universal Basic Income holds transformative potential to redefine India's social contract by ensuring dignity, security, and opportunity for all. Yet, its success depends on prudent fiscal design, robust digital delivery, and phased implementation. A carefully crafted, **inclusive UBI can complement and not replace existing welfare guarantees.** If pursued wisely, it could mark a decisive step toward a just and resilient India. ***As India stands at the crossroads of growth and inequality, UBI reminds us that true progress is not when wealth multiplies, but when dignity becomes universal.***

Transforming India'S Road Safety Landscape

This editorial is based on "Death on the move: On India's disgraceful record in fatal road accidents", which was published in The Hindu on 06/11/2025. The article underscores India's alarming road safety crisis, marked by escalating fatality rates, inadequate infrastructure, weak enforcement, and systemic governance failures, calling for urgent, evidence-based policy interventions to curb preventable road deaths.

Tag: GS Paper - 3, Indian Economy, Economic and Social Development, GS Paper 2, Public Policy, Issues Relating to Development, Government Policies & Interventions

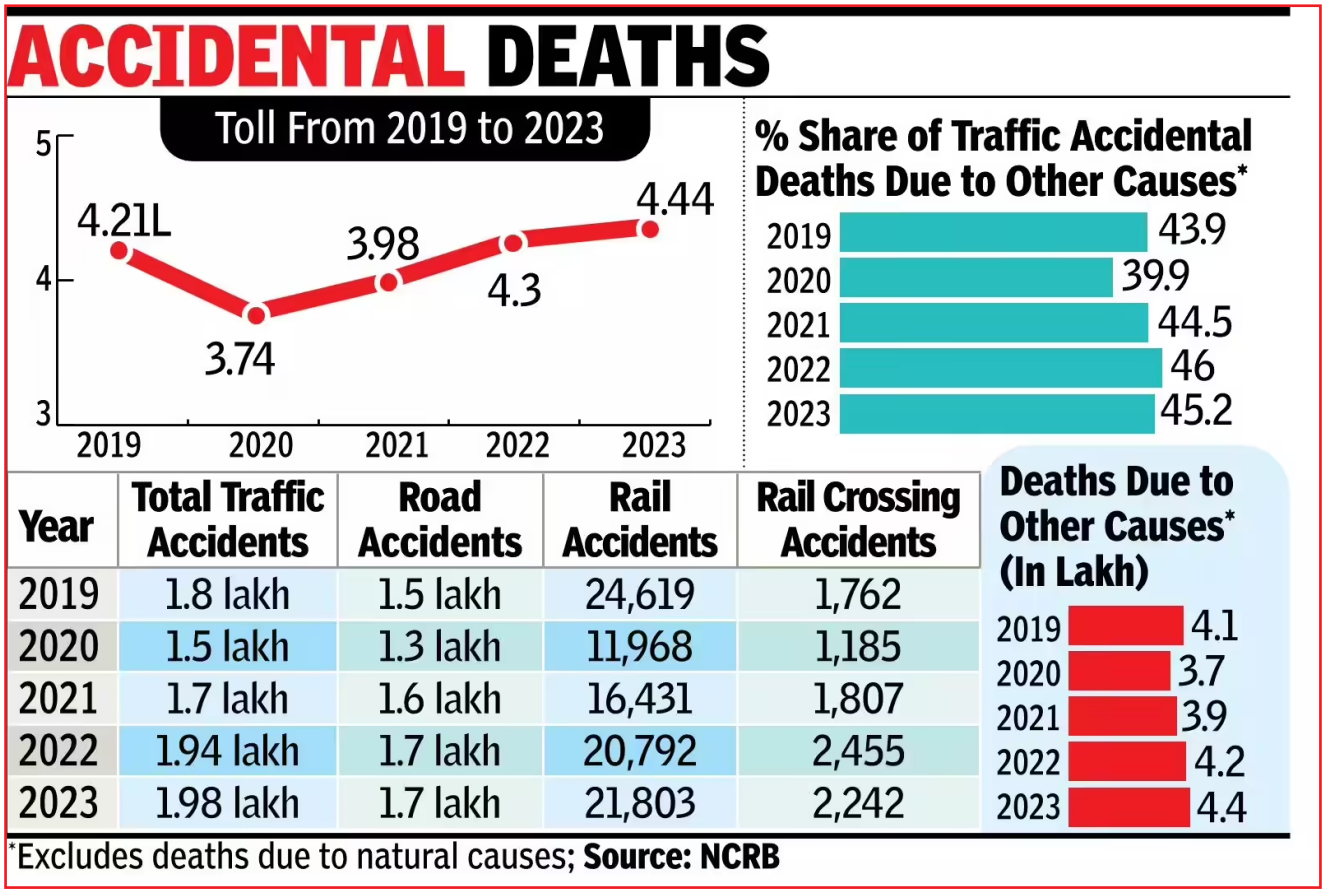
Recently, a **tragic accident** near **Chevella, Telangana**, claimed **19 lives**, including an infant, and left several injured when a **gravel-laden truck** collided **head-on** with a **Telangana State Road Transport Corporation bus**. Preliminary findings point to **overloading**, **poor road conditions**, and **loss of vehicle control** as key causes. This **devastating incident** serves as a grim reminder of India's **worsening road safety crisis**, exposing systemic **failures in enforcement, infrastructure, and accountability** that demand **urgent policy intervention**.

What is the Current Scenario of Road Accidents in India?

- **India's Road Accident Landscape:** India accounts for about **11% of global road accident deaths**, despite having only around **1% of the world's vehicles**.
  - India records the **highest absolute number of road accident deaths worldwide**, with **over 1.72 lakh fatalities in 2023**, increasing by **2.6%** from **1.68 lakh in 2022**.

- **National highways**, comprising only **2% of the road network**, account for **30% of the fatalities**, with **29,018 deaths** recorded in the **first half of 2025** alone.

- **Demographic and Regional Impact:** The **most affected age group** is **18–45 years**, representing **68% of male** and **58% of female** victims—the nation's **most productive population segment**.
  - **Pedestrians**, **two-wheeler riders**, and **vulnerable road users** face the **highest fatality rates**.
  - States such as **Tamil Nadu, Madhya Pradesh, Kerala, Uttar Pradesh,** and **Karnataka** collectively account for **over half** of the total accidents.
- **Economic and Social Costs:** Road accidents impose an **economic burden exceeding 3% of India's GDP** annually, factoring in **medical costs**, **emergency response**, and **productivity losses**.
- The Union Government aims to **reduce road fatalities by 50% by 2030,** as per India's commitment under the Stockholm Declaration (2020), though **current trends** and **institutional challenges** threaten to derail this target.



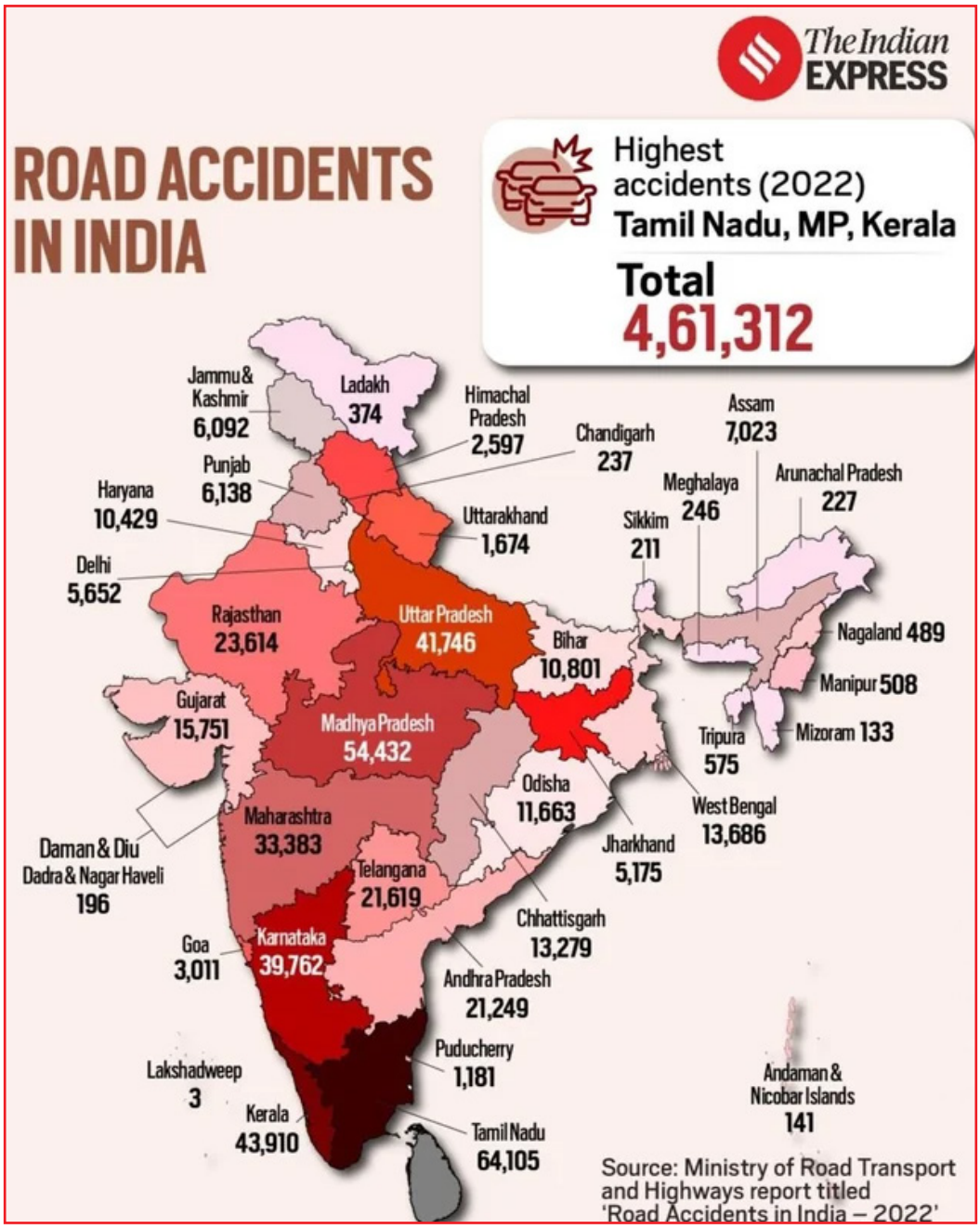
Year	Total Traffic Accidents	Road Accidents	Rail Accidents	Rail Crossing Accidents
2019	1.8 lakh	1.5 lakh	24,619	1,762
2020	1.5 lakh	1.3 lakh	11,968	1,185
2021	1.7 lakh	1.6 lakh	16,431	1,807
2022	1.94 lakh	1.7 lakh	20,792	2,455
2023	1.98 lakh	1.7 lakh	21,803	2,242

*Excludes deaths due to natural causes; **Source: NCRB**

What are the Major Challenges Impeding Road Safety in India?

- **Overspeeding: Overspeeding** accounts for nearly **70% of traffic deaths** in India, often on **national highways** and **expressways**.
  - For instance, in **November 2025**, a **rash-driven dumper truck crash** in **Jaipur** killed **14 people** due to overspeeding on urban roads.
  - Overspeeding increases both **accident frequency and severity**, demanding **stricter enforcement** and **speed monitoring technologies**.

- **Drunk Driving and Substance Abuse:** Despite stringent legal deterrents under **the Motor Vehicles (Amendment) Act, 2019,** drunk driving remains a pervasive cause of fatal road accidents in India.
  - For instance, recent data from **Delhi** reveals a sharp surge in **drunk driving cases**, recording **22,703 violations in 2024** — a **40% increase** compared to 2023.
  - **Enforcement during night hours** is weak, and **intoxication detection mechanisms** need expansion.
- **Distracted Driving (Mobile Phone Use):** Approximately **8% of accidents** stem from **distracted driving**, especially **mobile phone usage,** such as **texting while driving**.
  - Mobile phone use impairs **attention** and **reaction time**, leading to more severe crashes.
  - Increasing **smartphone penetration** demands **public awareness** coupled with **legislative action**.
- **Poor Road Infrastructure and Maintenance: Rapid motorisation** without corresponding **infrastructure** and **regulatory upgrades** leads to higher **accident probability**.
  - **Road accident numbers** increased from **3.7 lakh in 2020** to **4.8 lakh in 2023**, paralleling **vehicle growth rates**.
  - **Unsafe roads** marked by **potholes**, **insufficient signage**, **broken dividers**, and **accident-prone "black spots"** are a huge hazard.
    - The tragic **2025 Chevella crash** in **Telangana**, causing **19 deaths**, highlighted **infrastructural deficits** combined with **vehicle overloading**.
  - The government has identified more than **8,500 black spots** nationwide and is undertaking **remedial measures**, but long-term **infrastructural overhaul** requires overcoming **land acquisition** and **clearance hurdles**.
- **Non-use of Helmets and Seatbelts:** A general **lack of road safety awareness** and **traffic discipline** persists, especially regarding **helmet use**, **seat retention**, and **adherence to speed limits**.
  - **Non-compliance** with **safety gear** contributes to high fatalities.
    - According to the MoRTH report, in 2023, **54,568 two-wheeler riders**—including **39,160 drivers** and **15,408 passengers**—lost their lives **due to not wearing helmets**, accounting for **31.6% of all road accident deaths** that year.
    - Similarly, **16,025 fatalities** occurred among vehicle occupants **who were not wearing seatbelts**, comprising **8,441 drivers** and **7,584 passengers**, which represented **9.3% of total road deaths** in 2023.
  - **Behavioural change campaigns** like **"Sadak Suraksha Jeevan Raksha"** seek to **educate drivers and pedestrians** but need **scaling**.
- **Inadequate Driver Training and Licensing:** Many **drivers**, particularly in **rural areas**, operate **without valid licenses** or **formal training**, contributing to **reckless driving behaviours**.
  - Studies show that **untrained and unlicensed drivers** significantly influence **accident numbers and severity**.
  - The government aims to improve this via **district-level driver training centres** but **implementation** is uneven.
- **Weak Enforcement and Fragmented Institutional Governance: Enforcement of traffic laws** is patchy due to **coordination gaps** among multiple **agencies**.
  - **Electronic enforcement** such as **AI-driven speed cameras** and **CCTVs** is being piloted but not **widespread** yet.
  - The **National Road Safety Board** created for better coordination is yet to become **fully functional**.
  - Delays in **trauma care** and **ambulance availability** exacerbate **road accident fatality rates**.
  - Many **accident victims die** because they do not receive **timely medical intervention** within the critical **'Golden Hour'** post-accident.



What are the Major Government Initiatives Undertaken to Enhance Road Safety in India?

- **Motor Vehicles (Amendment) Act, 2019:** Enacted to **strengthen vehicle and driver regulation** with **stricter penalties** for offences like **overspeeding**, **drunk driving**, **helmet and seatbelt violations**.
  - Enables **electronic monitoring** and issuance of **e-challans**.
  - Mandates **vehicle safety features** including **airbags** and **ABS** in new vehicles and makes **driving licenses more stringent**.
  - Establishes **protections for Good Samaritans** to encourage accident aid.

- **National Road Safety Policy (NRSP):** Serves as the **policy backbone**, emphasizing **safe infrastructure**, **better licensing and training**, **law enforcement**, and **public awareness**.
  - Prioritises **eliminating black spots**, **strengthening road audit systems**, and **improving pedestrian and cyclist safety**.
  - Calls for **tailored interventions** recognising **regional disparities** in accident patterns and causes.
- **National Road Safety Board (NRSB):** Constituted to serve as a **central agency** for **road safety governance**, **policy coordination**, and **monitoring**.
- **Road Infrastructure Improvements and Black Spot Rectification:** Over **8,500 identified black spots** (high-risk accident zones) are targeted for remediation, with measures including **signage upgrades**, **road widening**, **installation of crash barriers**, and **geometric improvements**.
  - **Road safety audits** have been made **mandatory** for all **National Highway projects** from the design to the maintenance stage.
  - Enhanced **funding for road safety** is incorporated into highway projects, ranging from **2–15%** of total costs.
- **Advanced Traffic Enforcement Technologies:** Rollout of **Automatic Number Plate Recognition (ANPR)** systems, **speed and red-light cameras**, and **AI-enabled video incident detection** on key highways and urban roads.
  - **Virtual court systems** for faster adjudication of traffic offences were launched, integrating **digital penalty collection** and **blacklisting of repeat offenders**.
  - Central guidelines were issued for **electronic monitoring** in all **cities with populations over one million**.
- **Driving Training, Licensing, and Vehicle Fitness:** Establishment of **driving training centres** and **vehicle fitness testing facilities** across all districts to enhance competence and compliance.
  - Steps toward the **digitisation of licensing processes** and **standardisation of training curricula**.
- **Emergency Medical Services and Trauma Care:** Strengthening **pre-hospital care infrastructure** through the **National Highway Accident Relief Service Scheme (NHARSS)**.
- **Public Awareness Campaigns and Education:** National campaigns like **"Sadak Suraksha Jeevan Raksha"** promote **helmet use**, **seatbelt compliance**, **safe speeds**, and **responsible road usage**.
  - Inclusion of **road safety education** within **school curricula** to inculcate early awareness.
  - Engagement with **civil society groups,** such as **SaveLIFE Foundation,** for **grassroots behavioural change initiatives**.
- **Data-Driven Policy and Transparency:** Development of a **National Database for Fatal Crashes** to compile **comprehensive, real-time accident data,** assisting in **targeted interventions**.
- **Public access to accident data** fosters **transparency** and **accountability** among authorities.
- Adoption of **data analytics** and **Geographic Information Systems (GIS)** to **map accident hotspots** and **prioritise safety investments**.

What Comprehensive Measures can be Adopted to Strengthen the Road Safety Ecosystem in India?

- **Implement the Safe System Approach with Rigorous Road Safety Audits:** India should institutionalise the **Safe System Approach**, which acknowledges **human error** but designs roads and policies to **minimise fatal consequences**.
  - This includes **mandatory road safety audits** at every stage of **highway and urban road development**, as recommended by the **Indian Road Safety Board** and **Supreme Court guidelines**.
  - Regular audits ensure infrastructure addresses **pedestrian needs**, **vulnerable users**, and **accident black spots**, reducing risks systematically.
- **Strengthen Law Enforcement Using Technology and Stricter Penalties:** To curb **overspeeding**, **drunk driving**, and **non-compliance** with helmet/seatbelt laws, India must expand **electronic enforcement** via **AI-enabled cameras**, **speed detection systems**, and **e-challan integration**, as piloted in **Uttar Pradesh**.
  - The **Motor Vehicles (Amendment) Act, 2019** should be fully enforced nationwide with **stringent penalties**, **repeat offender tracking**, and **virtual courts** for faster adjudication.
  - The **Sundar Committee** recommended the establishment of a **National Road Safety and Traffic Management Board** along with a **National Road Safety Fund** to ensure coordinated policy implementation, effective regulation, and sustained financing for road safety initiatives across India.
- **Modernise and Maintain Road Infrastructure with Inclusive Design:** India must increase investment in **engineering safer roads**—eliminating **black spots**, improving **road signage**, **lighting**, **pedestrian crossings**, and **cycling lanes**.
  - Infrastructure must accommodate **vulnerable groups**, including **pedestrians** and **disabled persons**.
  - Lessons from **Scandinavian countries** demonstrate the efficacy of well-maintained roads with **integrated safety features**.
  - **Urban planning** should decongest roads and ensure safer **last-mile connectivity**.
    - The **UN's Second Decade of Action for Road Safety (2021–2030)** aims to **reduce global road traffic deaths and injuries by at least 50% by 2030**, emphasizing a coordinated global effort to enhance **road infrastructure, enforcement, vehicle safety, and public awareness** under a shared vision of safe and sustainable mobility for all.
- **Enhance Driver Training, Licensing, and Certification:** Robust reforms are required to plug gaps in **driver competence**.
  - **District-level driving training centers** should be scaled up, with **standardised curricula** based on **international norms**, including **practical assessments** and **psychological fitness checks**.
  - **Digitization** of license issuance and stringent controls on **fake licenses** will improve road discipline.
  - **Periodic refresher courses** and **re-certifications**, similar to **Singapore's model**, could enhance driver accountability.
- **Invest in Trauma Care and Emergency Medical Services (EMS):** India's high **post-accident fatality rate** can be reduced by improving **EMS infrastructure**.
  - Expansion of **trauma centres** along highways, **ambulances with trained paramedics** at toll plazas (under **NHARSS**), and **cashless treatment schemes** must be accelerated nationwide.
  - The **'Golden Hour'** post-accident interventions require better **ambulance response times** and **hospital coordination**, as per **Supreme Court directives** and **WHO recommendations**.
  - Equally important is the **protection and incentivization of Good Samaritans who assist accident victims**, through legal

safeguards, public awareness, and reward mechanisms **to encourage timely help without fear of harassment or legal repercussions.**

- **Promote Public Awareness and Behavioural Change Campaigns:** Sustained public campaigns like **"Sadak Suraksha Jeevan Raksha"**, incorporated into **National Road Safety Month**, must focus on **helmet use**, **speed adherence**, and **sober driving**.
  - **Mandatory road safety education** in schools and driver training institutes can inculcate a culture of compliance.
  - Engaging **NGOs**, **media**, and **corporations** in **behaviour modification initiatives** aligned with the **WHO's Decade of Action** could deepen impact.
- **Develop a Robust National Road Safety Data Ecosystem:** Implementing a **comprehensive national crash database** with **real-time reporting** via **e-DAR systems** enables **evidence-based policymaking**.
  - Public access to **road accident databases**, as implemented by the **UK's STATS19 system**, promotes **transparency, accountability, and data-driven policymaking**, enabling citizens and researchers to monitor trends and assess policy outcomes.
    - India's **MoRTH Crash Data Portal** offers a foundational step toward building a **comprehensive, open-access road safety information system** that supports evidence-based interventions.
  - Integration of **Geographic Information Systems (GIS)** and **Artificial Intelligence (AI)** can help identify **risk patterns** and prioritise **high-impact interventions**.

Conclusion:

Since road accidents are **caused, not inevitable**, even a moment of **negligence** can devastate lives. The **Kerala High Court** rightly emphasized that **road safety** is not just a rule but a **collective responsibility**. To achieve **SDG Target 3.6** and halve road deaths by 2030, India must adopt the **Safe System Approach**, strengthen **technology-based enforcement**, modernize **infrastructure**, improve **driver training** and **trauma care**, and enhance **data-driven monitoring** through sustained **public awareness** and **judicial oversight** for **accountability** and **safer roads**.

A Wake-Up Call for India'S Wildlife Governance

This editorial is based on "Greater openness: On India and wildlife management" which was published in The Hindu on 10/11/2025. The article brings into picture the recent CITES panel's concerns over India's wildlife permit system, exemplified by the Vantara case in Jamnagar, exposing deeper flaws in wildlife governance. It underscores the urgent need for India to strengthen its conservation framework and global coordination to restore trust in its environmental stewardship.

Tag: GS Paper - 3, Conservation, GS Paper - 2, Government Policies & Interventions

A recent **CITES committee report** has raised serious questions about **India's wildlife permit system**, recommending a pause on endangered animal imports to zoos following its investigation of the **Vantara project in Jamnagar**. This episode, however, is symptomatic of deeper structural challenges in **India's wildlife management architecture**. Despite pioneering conservation successes like **Project Tiger,** India's wildlife governance suffers from **fragmented authority between central and state agencies,** inadequate inter-departmental coordination, weak enforcement mechanisms, and poor international engagement on traceability standards. As custodian of some of the **world's most vital biospheres,** India must urgently strengthen its wildlife management systems and international coordination to restore global trust in its conservation credentials.

What are the Major Strides of India in the Field of Wildlife Management?

- **Flagship Species Conservation Success:** The sustained, dedicated government program, **'Project Tiger' (started 1973)**, has successfully countered extinction threats for India's national

animal through a **'core-buffer' strategy and intensive management**.

- This achievement is a global benchmark for large carnivore conservation, showcasing effective policy implementation and enforcement.
  - The establishment of the **National Tiger Conservation Authority (NTCA)** has institutionalized protection and monitoring.
- The tiger population has risen from a low of **1,411 in 2006** to an estimated **3,682 in 2022**, representing over **75%** of the world's wild tiger population. India currently manages **58 Tiger Reserves** across the nation.

- **Landscape-level Habitat Connectivity:** A major stride is the shift to **landscape-level conservation**, recognizing the need for **wildlife corridors** outside protected areas to ensure genetic flow and climate change resilience.
  - This approach treats interconnected forests as single management units, addressing habitat fragmentation caused by developmental projects. This has led to the **delineation of Elephant Reserves and better infrastructure planning.**
  - **Project Elephant** manages **33 Elephant Reserves** across **14 states** and the **Forest Survey of India (FSI) works on mapping these corridors.**
- **Community-Centric Conservation Models:** There's a growing embrace of **community-based conservation**, officially establishing **Community Reserves** and **Conservation Reserves** to involve local people and secure their traditional knowledge in protecting biodiversity. This represents a crucial shift from **exclusionary to inclusive management.**
  - The **Wildlife (Protection) Act, 1972 (WLPA)** now legally recognizes Community Reserves.
  - India's network now includes **115 Conservation Reserves and 220 Community Reserve** as of late 2023, with success examples like the **Amur Falcon conservation led by the Phom community in Nagaland.**
- **Adoption of Advanced Monitoring Technology:** The integration of **advanced technology** like **M-STrIPES (Monitoring System for Tigers-Intensive Protection and Ecological Status)** and **AI-driven surveillance** is a game-changer in combating poaching and managing wildlife populations. Technology provides a robust, scientific foundation for real-time decision-making.
  - The **use of drones and GPS for mapping and surveillance** significantly boosts the capacity of field staff. This scientific management is recognized globally.
  - **Solar-powered electronic fencing and early warning systems** using sensors and mobile alerts have proven effective in mitigating **human-wildlife conflict,** particularly in elephant corridors, reducing crop damage while ensuring animal safety.
- **Targeted Single-Species Recovery Projects:** India has strengthened several highly **focused, single-species projects** beyond the tiger, demonstrating a dedicated effort to **rescue specific threatened, endemic, or ecologically significant species from the brink of extinction**. These programs utilize captive breeding and translocation.
  - This tailored approach, often involving international partnerships, prevents local extinction and restores ecological balance in their specific habitats.
  - **Project Cheetah** successfully reintroduced the species to **Kuno National Park** in 2022 after its extinction, and the **One-Horned Rhino population** in Assam reached over **4,000** by 2024, largely due to **Indian Rhino Vision 2020.**
- **Proactive Policy and Legal Revisions:** Recent **legal and policy reforms**, particularly the **Wild Life (Protection) Amendment Act, 2022**, showcase a proactive governance approach to **align national laws with international treaties like CITES and enhance protection.** This strengthens the enforcement mechanism against wildlife crime.
  - This demonstrates legal maturity.
  - India's commitment to the **Kunming-Montreal Global Biodiversity Framework** and the **30x30**

target (protecting 30% of land and sea by 2030) signals alignment with global conservation goals while adapting them to domestic ecological and socio-economic realities.

- **Mainstreaming Biodiversity into Development:** There is an increasing, albeit challenging, effort to **mainstream biodiversity concerns** into major infrastructure and developmental planning through robust **Environmental Impact Assessments (EIAs)** and compensatory afforestation. This recognizes that development cannot occur at the cost of crucial ecosystems.
  - The legal mechanism of **compensatory afforestation and the requirement for EIAs** attempt to balance infrastructure needs with essential ecosystem preservation. This is a progressive governance step.
  - According to the **Supreme Court-mandated Central Empowered Committee (CEC),** India achieved about **85% of its compensatory afforestation goal**, planting around 1.78 lakh hectares of forest area against a target of 2.09 lakh hectares between 2019-20 and 2023-24.

What are the Major Issues Associated with India's Wildlife Protection Framework?

- **Weak Enforcement and Low Conviction Rates:** Despite stringent laws like the **amended WLPA**, enforcement remains porous, often due to **inadequate training, poor investigative procedures, and the complex nature of organized transnational wildlife crime.**
  - This structural weakness severely undermines deterrence and enables criminal networks to operate with relative impunity across state boundaries.
  - The **conviction rate for wildlife crimes is alarmingly low, historically around 2-3%.** Between 2020 and 2024, a total of **2,701 wildlife crime cases were registered,** but the lack of successful prosecution fails to match the scale of illegal trade in species like **pangolins or star tortoises,** fostering a low-risk, high-reward environment for poachers.
- **Escalating Human-Wildlife Conflict (HWC):** The increasing HWC stems from habitat fragmentation and linear infrastructure development, pushing **megafauna like elephants and big cats** into human-dominated landscapes, which strains local tolerance and results in retaliatory killings.
  - The lack of proactive, science-based conflict mitigation strategies and prompt compensation mechanisms exacerbates this critical issue.
  - A 2024 report stated that **Human-elephant conflicts led to 2853 human deaths** over the past five years, peaking at 628 in 2023, a clear indicator of the conflict's intensity.
    - In recent years**, high-conflict states like Kerala have recorded hundreds of HWC incidents annually**, driven by species like elephants and wild pigs encroaching on agricultural lands and settlements.
- **Dilution of CITES Compliance and Import Due Diligence:** Recent developments have exposed lapses in **CITES (Convention on International Trade in Endangered Species) compliance**, particularly concerning the **import of exotic live animals,** raising alarms about potential pathways for illegal wildlife trade disguised as legitimate transfers.
  - Following the controversy over the **import of exotic animals,** a CITES committee recommended India pause import permits until due diligence is systematically reviewed.
    - Issues included the **non-tallying of exported and imported animal numbers,** such as in one instance involving a discrepancy between 14 and 24 exported cheetahs from Mexico.
- **Poor Management of Protected Area (PA) Buffer Zones:** The core PA network is often surrounded by **vulnerable buffer and corridor areas that face tremendous biotic pressure from grazing, resource extraction, and infrastructure projects,** undermining the landscape-level connectivity vital for wildlife.
  - Management plans frequently fail to adequately integrate the rights and livelihood needs of dependent local and tribal communities.

- In states like **Madhya Pradesh,** the **recent forest cover increase is largely due to plantations,** not natural forests, which lowers ecological resilience.

- **Definitional Ambiguity in the WLPA Amendment, 2022:** The recent **Wildlife (Protection) Amendment Act, 2022,** while incorporating CITES, has created ambiguities regarding the classification of protected species, offering the same high protection level to common species as to critically endangered ones, complicating resource allocation.
  - The new Schedule I gives the same protection to common species like the **jackals as the Tiger.**
  - Critically, the **provision allowing the use of elephants for "any other purpose" is prone to misuse,** potentially legalizing commercial trade through a loophole.
- **Insufficient Focus on Invasive Alien Species:** The framework has been historically reactive to **invasive alien species,** which pose a grave, yet often overlooked, threat to native biodiversity by outcompeting local flora and fauna, altering ecosystems, and transmitting diseases.
  - The **presence of invasive species like Lantana camara in over 40% of India's tiger reserves** demonstrates a significant management failure that degrades native habitat quality and prey base.
  - Also, Invasive species like the **Red-eared Slider Turtle** pose a severe threat to native turtle species across India.
    - Their proliferation, often **fueled by irresponsible pet trade and subsequent abandonment,** highlights a failure to effectively implement the regulatory power to prevent their import and spread.
- **Under-implementation of the Forest Rights Act (FRA), 2006:** The persistent failure to fully implement the **Forest Rights Act (FRA)** within and around **Protected Areas** remains a key socio-ecological issue, as it leads to unresolved land conflicts and alienates local communities, which are essential partners in conservation.
  - This denial of rights compromises traditional stewardship and makes communities less likely to report or cooperate on anti-poaching efforts.
  - The **Jenu Kuruba tribe in Karnataka's Nagarhole National Park** exemplifies this denial, where rights recognition is often delayed or rejected,

What Measures can India Adopt to Enhance its Wildlife Protection Framework?

- **Mandate Landscape-Level Ecological Integrity Planning:** India must transition from fragmented Protected Area (PA) management to **mandated, enforceable, and legally-backed landscape-level planning**, prioritizing the functional connectivity of corridors and buffer zones.
  - This requires the integration of wildlife concerns into all major infrastructure and developmental projects through a **rigorous "Ecological Connectivity Impact Assessment" (EIA supplement)**, moving beyond simple forest diversion to assessing net ecological loss.
  - The focus must shift to **proactive land-use zoning** in revenue areas adjacent to PAs, ensuring linear infrastructure is mitigated with state-of-the-art wildlife crossings and overpasses designed for large-mammal movement.
- **Establish a Dedicated Wildlife Crime Prosecution Wing:** To overcome the pervasive issue of low conviction rates, a **specialized, multi-disciplinary Wildlife Crime Prosecution Cadre** must be established, comprising dedicated public prosecutors, forensic experts, and investigators.
  - This unit, working under the **Wildlife Crime Control Bureau (WCCB)**, would be trained in **cyber forensics, chain-of-custody protocols for biological evidence (DNA),** and cross-border intelligence sharing, thereby ensuring **conviction-oriented case preparation**.

- This professionalization of the legal process is crucial to dismantling organized transnational poaching and illegal trade syndicates that currently exploit judicial weaknesses.

- **Implement AI-Driven, Predictive Conflict Mitigation Systems:** A national program should be launched to deploy **AI and IoT-based real-time warning systems** across **high Human-Wildlife Conflict (HWC) zones**, especially for elephants and big cats.
  - This involves using **thermal-sensing drones, bio-acoustic sensors, and machine learning models** to predict animal movement patterns based on weather, crop cycles, and historical data, pushing **geo-fenced, language-specific alerts directly to community early warning apps**.
  - Concurrently, funds should be allocated for creating **habitat enrichment zones** within forest boundaries, like native grass plantations and water sources, to reduce the ecological incentive for animals to venture into human settlements.
- **Decentralize and Empower Community-Led Conservation Governance:** The framework must be redefined to fully and genuinely empower **Village Gram Sabhas** with **Community Forest Resource (CFR) rights** over designated buffer and eco-sensitive zones, as per the **Forest Rights Act (FRA).**
  - This devolution of authority for non-timber forest produce and micro-planning fosters a direct stake in conservation, transforming local people from potential adversaries to indispensable partners, thereby enhancing **natural surveillance and intelligence gathering against poaching**.
  - Furthermore, **community members should be hired and trained as 'Wildlife Custodians' under a competitive, permanent-cadre scheme,** linking their livelihood directly to biodiversity health.
- **Introduce Performance-Linked Conservation Financing and Autonomy:** The central government must **establish a competitive, performance-based funding mechanism for State Forest Departments and Protected Area administrations,** replacing the current centralized allocation model.
  - Funds should be tied to measurable outcomes, such as sustained increases in species populations, demonstrable improvements in habitat quality **(e.g., invasive species removal success),** and community participation metrics.
  - Simultaneously, PAs should be granted **greater administrative and financial autonomy** to swiftly hire specialized personnel, procure technology, and implement local conservation strategies without being hindered by rigid, slow bureaucratic processes.
- **Modernize the Wildlife (Protection) Act through Digitalization:** A comprehensive project is needed to **fully digitize all aspects of wildlife crime enforcement and monitoring**, creating a centralized, real-time national database accessible to all law enforcement agencies **(Forest, Police, Customs, Judiciary).**
  - This modernization involves the mandatory use of **digital proof collection (e.g., geotagged evidence)**, a unified species identification database with genetic markers, and an **e-governance portal for CITES permits** to ensure traceability and transparency.
  - Some experts, including **Madhav Gadgil,** have suggested major reforms to the Wildlife Protection Act, advocating for its repeal.
    - Instead of repealing the Act altogether, it should be comprehensively reformed to strengthen its effectiveness and address existing gaps.

Conclusion:

India's wildlife protection framework stands at a crucial crossroads balancing its rich conservation legacy with emerging governance and compliance challenges. Strengthening enforcement, empowering communities, and embracing technology-driven, landscape-level conservation are vital next steps. Aligning these reforms

with **SDG 15 (Life on Land), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals)** will reinforce India's global conservation leadership. A **resilient, transparent, and inclusive framework** can restore both **ecological balance and international trust** in India's stewardship of biodiversity.

Shaping the Future Of AI Governance

This editorial is based on "Beijing's WAICO could determine new global AI order. India must be vigilant" which was published in The Indian Express on 11/11/2025. The article brings into picture China's proposal to establish the World Artificial Intelligence Cooperation Organization (WAICO) in Shanghai, reflecting its intent to shape global AI governance. For India, it underscores the need to engage cautiously—pushing for transparency and inclusivity without yielding strategic ground.

Tag: GS Paper - 3, Robotics, Artificial Intelligence, Scientific Innovations & Discoveries, GS Paper - 2, Effect of Policies & Politics of Countries on India's Interests

China has proposed establishing **WAICO, a World Artificial Intelligence Cooperation Organization** headquartered in Shanghai, positioning itself as the architect of global AI governance rules. This initiative, announced at the **APEC Summit,** is Beijing's latest bid to **rewrite multilateralism in its favor,** following a series of **China-led global frameworks**. While promising technology-sharing and funding for the Global South, the proposal raises critical questions about **transparency, control, and whether it will complement or compete with UN-led AI governance efforts**. For India, the challenge is clear: **engage without endorsing,** demand transparency over geography, and **ensure access is not contingent on allegiance**. As AI becomes the currency of geopolitical influence, the rules being written today will determine who shapes innovation tomorrow and India must help write them or risk living under rules others author.

What are the Existing Global Governance Mechanisms for Artificial Intelligence?

- **International Organizations-Soft Law & Principles:** Global institutions are developing ethical frameworks and non-binding principles to guide national AI governance, promoting human-centric development and shared global values.
  - This soft law approach encourages consensus but lacks enforcement mechanisms, slowing progress toward concrete accountability.
  - The **UNESCO Recommendation on the Ethics of AI (2021) was the first global standard, adopted by 194 Member States**.
  - Similarly, in 2024 the **UN General Assembly adopted a resolution on the promotion of "safe, secure and trustworthy" artificial intelligence (AI) systems that will also benefit sustainable development for all**.
- **Regional Hard Law-The EU AI Act Model:** The **European Union's AI Act is the world's first comprehensive, risk-based legal framework for AI,** classifying systems by potential harm to determine regulatory obligations.
  - **This hard law framework creates a Brussels Effect,** setting a de facto global benchmark, though critics argue it may stifle innovation in certain sectors.
  - The **Act will be fully applicable by June 2026,** with bans on **"unacceptable-risk"** systems (like social scoring) coming into force earlier.
    - **Generative AI models (such as GPT-4)** that pose systemic risks must comply with evaluation and reporting norms, especially those trained on more than 10^{25} floating-point operations (FLOPs).
- **Global Summits & Safety Initiatives:** High-level international summits are driving voluntary collaboration between governments and AI developers to address frontier risks.
  - While these initiatives encourage rapid risk mitigation, they often lack Global South participation and legally binding commitments.
  - The **Bletchley Declaration (UK, 2023)** and **AI Seoul Summit (2024)** brought together major powers to cooperate on AI safety research.

- The **upcoming India–AI Impact Summit (2026)** will be the first **large-scale AI summit in the Global South,** aiming for a more inclusive, sustainable, and human-centric governance agenda.

- **Multilateral Groupings-Geopolitical Influence:** Forums such as the G7 and BRICS are leveraging AI governance to project geopolitical and economic influence, creating parallel governance pathways.
  - However, this growing fragmentation risks a **"splinternet" of AI regulations,** complicating global interoperability and trade.
  - The **G7 Hiroshima AI Process (2023)** launched an International Code of Conduct for AI developers, emphasizing trustworthy AI aligned with democratic values.
  - Meanwhile, **BRICS, under Brazil's 2025 presidency, is championing South–South cooperation** and **BRICS Leaders' Declaration on Global Governance of Artificial Intelligence has gained prominence.**
- **Industry Self-Governance & Standards:** The private sector plays a vital (though sometimes self-interested) role in setting technical standards and ethical commitments.
  - While this ensures agility in managing emerging risks, it raises concerns over regulatory capture and limited public accountability.
  - Major tech firms have created mechanisms like the **Frontier AI Safety Commitments,** pledging responsible testing and deployment.
  - Additionally, the **US Executive Order 14110 (2023) requires developers of powerful AI models to notify the government,** marking a shift toward greater oversight and accountability in high-risk AI systems.

What are the Key Issues Hindering Unified Global Framework for AI Governance?

- **Geopolitical and Ideological Fragmentation:** The major global powers have fundamentally **divergent values and strategic objectives** for AI, which prevents consensus on core regulatory principles.
  - The competition for **AI supremacy** between the US and China forces other nations to align, causing regulatory divergence in areas like data privacy and military applications.
  - **The EU's AI Act emphasizes fundamental rights with fines up to 7% of global revenue,** setting a cautious precedent.
    - Conversely, the US **Executive Order 14110** prioritizes national security and innovation, creating an ideological divide on key issues such as **cross-border data flows** and state-access mandates.
- **Pace of Technological Advancement vs. Law:** The **exponential speed of AI innovation**, particularly in generative models, consistently **outpaces the slow, deliberative legislative process**, making any unified governance framework quickly obsolete.
  - By the time international treaties or comprehensive laws are finalized, the underlying technology has already advanced to present new, unforeseen risks.
  - Model capabilities, such as **those powering GPT-5 or newer systems,** are estimated to increase dramatically, while the EU AI Act took **over three years** to pass.
    - The cost to train frontier AI models is reported to be **doubling every nine months**, outpacing regulatory adaptation speed and necessitating agile, outcome-based rules.
- **Resource and Infrastructure Disparities:** A deep **economic and infrastructural divide** exists where most AI development, compute power, and talent are concentrated in the Global North, leaving the Global South to bear the risks of deployed, un-audited systems.
  - This disparity leads to governance frameworks that **do not address the developmental priorities** or capacity constraints of low-income nations.
  - **IMF analysis suggests AI's economic dividends could be more than twice as large in advanced economies** compared to low-income countries, demonstrating the widening gap.

- **Socio-Cultural Dimensions of AI Bias:** There is **no global consensus on defining core ethical concepts** like **"fairness," "bias," or "explainability"** in AI, as these terms are deeply rooted in diverse cultural and legal traditions.
  - Moreover, the **absence of universal norms also gives rise to social challenges — including algorithmic discrimination in hiring, gender and caste bias in automated decision-making,** exclusion of marginalized communities from digital benefits, and reinforcement of stereotypes through biased datasets.
  - For instance, an **AI trained primarily on US or European data often exhibits performance degradation and bias when deployed in African or Asian contexts** due to lack of representative data.
- **Data Sovereignty and Cross-Border Flow Conflicts:** National laws asserting **data sovereignty** and privacy rights impose conflicting rules on **cross-border data flows**, which are the lifeblood of large-scale AI model training.
  - This regulatory **Balkanization** forces AI companies to create regional silos, fragmenting the global AI ecosystem instead of unifying it.
  - The **EU's GDPR** and the new US regulations targeting data transfers to **"countries of concern" (like China)** exemplify this trend.
  - **South Korea's Personal Information Protection Commission has previously ordered an international fintech company to destroy AI models trained with personal data acquired improperly**, demonstrating the legal risks of cross-border data use.
- **Technical Opacity and Accountability Bottlenecks:** The **"black box" nature of complex foundation models** hinders the ability of regulators to effectively audit, explain, or assign liability for autonomous AI decisions, undermining traditional legal mechanisms.
  - Without standardized technical requirements for **transparency and traceability**, enforcement of any global rule remains tenuous.
  - The latest **Large Language Models (LLMs)** can have trillions of parameters, making their decision-making processes virtually opaque to human inspectors.
    - This opacity complicates compliance with **"explainability" and "human oversight"** principles found in regulations like the **EU AI Act**, shifting the burden of proof away from the developer.

How can India Harness Artificial Intelligence to Enhance its Diplomatic Capabilities and Global Influence?

- **Multilateral Governance Leadership:** India should use its domestic **'AI for All'** philosophy to champion an **inclusive, ethical, and public-good-oriented** global AI governance framework, attracting support from the Global South.
  - India's **co-chairmanship of the AI Action Summit (2025) with France** and its hosting of the **India-AI Impact Summit** (2026) highlight its global convener role.
    - **The IndiaAI Mission, with a ₹10,371.92 crore (approx. $1.25 billion) outlay**, is explicitly intended to bolster global leadership and tech self-reliance.
    - Further strengthening this vision, the **Digital Personal Data Protection Act (2023)** establishes a rights-based data governance framework, while the upcoming **Digital India Act** aims to modernize tech regulation and ensure accountable, innovation-friendly AI deployment.
- **Digital Public Infrastructure (DPI) as a Global Template:** Leveraging AI within its world-leading DPI, like the **Aadhaar, UPI, and DigiLocker stacks**, allows India to export a low-cost, high-impact model for developing nations, cementing its **developmental leadership** role.
  - This AI-integrated DPI demonstrates a scalable, inclusive, and democratized approach to technology, contrasting with proprietary Western models.

- The **AI-powered, multilingual BHASHINI platform** is an example, breaking language barriers in digital services and diplomacy.
  - **Hanooman's Everest 1.0,** a multilingual AI system developed by SML, Everest 1.0 supports 35 Indian languages, with plans to expand to 90.
- The **world's first government-funded multimodal LLM initiative, BharatGen was launched in 2024.**
  - It aims to enhance public service delivery and citizen engagement through foundational models in language, speech, and computer vision.

- **Enhanced Diplomatic Negotiation & Consular Services:** AI can improve the efficiency and effectiveness of India's diplomatic engagement by automating **labor-intensive tasks** and providing data-backed negotiation strategies.
  - This **frees up human diplomats to focus on high-stakes, nuanced political relationship-building**, maximizing the impact of limited personnel.
  - AI-powered systems can analyze patterns in historical diplomatic records and **forecast potential crises** or successful collaboration points.
    - Furthermore, the **use of AI in the Passport Seva Programme (PSP)** streamlines citizen services, improving the perception and efficacy of India's consular outreach globally.
- **Economic Diplomacy and Supply Chain Resilience:** Harnessing AI to analyze complex global supply chains, trade agreements, and investment trends will allow Indian economic diplomacy to become **highly targeted and resilient**.
  - This ensures policy decisions maximize economic gain, positioning India as a reliable and informed partner in the global economic architecture.
    - The **Reserve Bank of India's MuleHunter.AI** tool, designed to detect fraudulent accounts, enhances financial security, a key trust factor in international banking and investment.
- **Cyber Resilience and Tech-Security Partnership:** By developing cutting-edge AI for **cybersecurity and defense**, India strengthens its domestic security while becoming a crucial partner in technology security for allied nations, particularly in the Indo-Pacific.
  - This creates a **strategic reliance** on Indian AI expertise, boosting its profile as a responsible security provider.
  - India's focus on **cyber-physical systems** through the **National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS)** addresses dual-use technologies.
- **Strategic Intelligence & Policy Foresight:** AI can transform the **Ministry of External Affairs' (MEA) strategic intelligence** by rapidly processing vast, diverse data to preempt geopolitical shifts and identify critical opportunities.
  - This provides a crucial **foresight advantage** in complex, multi-polar diplomacy, allowing India to proactively shape narratives rather than merely react to events.
  - For instance, the **Indian Army has integrated the AI-driven Trinetra system with the Battlefield Surveillance System (Sanjay)** to create a unified surveillance picture.
    - This fusion of ground and airborne sensor data enhances commanders' situational awareness and enables faster decision-making during operations with Pakistan.
  - According to the **Stanford AI Index 2024**, India ranks first globally in AI skill penetration with a score of 2.8, ahead of the US (2.2) and Germany (1.9) which can be harnessed to further **enhance strategic intelligence.**

What Measures can be Adopted to Progress Towards a Responsible and Inclusive Global AI Governance Framework?

- **Establishing a Polycentric 'Governance Commons':** The core argument is that attempting a single, monolithic global regulator is infeasible due to geopolitical resistance; thus, the solution lies in building a **polycentric governance commons**.
  - This involves creating **interoperable, specialized institutions** that focus on narrow, high-impact areas like safety or standards, allowing global cooperation without sacrificing national sovereignty.
  - This decentralized, **'networked' model facilitates agile coordination between existing bodies (UN, G7, OECD, etc.)** to address systemic risks while respecting diverse regulatory approaches.
- **Risk-Adaptive Regulatory Sandboxes (ARRS):** A critical measure is the establishment of **Risk-Adaptive Regulatory Sandboxes (ARRS)**, distinct from simple *Innovation Sandboxes*.
  - Governance must be a **living, iterative process** that constantly recalibrates rules based on real-world system performance and potential harm escalation.
  - These sandboxes **allow high-risk models to be tested in controlled, simulated environments**, with rules automatically tightening or relaxing based on demonstrable safety metrics and compliance adherence, ensuring regulation keeps pace with technological speed.
- **Global South-Led AI Capacity Hubs:** To ensure inclusivity, a **Global South-Led AI Capacity Hub** measure must be adopted.
  - Mere inclusion in *discussions* is insufficient; true inclusion requires **sovereign technical and regulatory capacity**.
  - These hubs, financially backed by developed nations and international finance institutions, would focus on **developing open-source, decolonized Foundation Models** and training regulators from developing nations on **data governance, model auditing, and localized risk assessment**.
- **Mandatory Digital Provenance and Labeling:** A key practical measure is mandating **Digital Provenance and Labeling Standards** for all AI-generated content and high-risk models.
  - **Trust is operationalized through traceability**; users and regulators must be able to verify the origin and development history of AI outputs.
  - This involves creating a global, standardized **"AI Passport"** or metadata system **to verify whether content is synthetic (deepfakes)** and document a model's training data and bias audits, making accountability a technical requirement.
- **'Techno-Legal' Compliance Integration:** Countries must implement **'Techno-Legal' Compliance Integration**, which embeds governance directly into the **AI development lifecycle (MLOps)**.
  - This involves creating and sharing standardized **Policy-as-Code libraries and automated compliance tools that check for ethical criteria, bias, and legal requirements (like data privacy),** automatically flagging non-compliance during model development, making responsible AI the default setting.
- **Standardized Model Card and Audit APIs (Application Programming Interfaces):** A crucial technical measure is to globally mandate **Standardized Model Card and Audit APIs** for all foundation models.
  - **Technical compliance must be machine-readable and universally comparable**, moving beyond opaque, document-based disclosures.
  - These standardized APIs would allow independent third-party auditors and regulators across the globe to programmatically access, test, and verify key governance parameters, such as bias metrics, safety guardrails, and provenance data, fostering a culture of **verifiable transparency**.

Conclusion:

AI governance is fast emerging as the new arena of global power and principle. As nations race to shape its rules, **India must champion an inclusive, human-centric, and equitable framework that bridges the Global North–South divide**. By aligning innovation with ethics and sovereignty with cooperation, India can help script a shared AI future. The moment to act is now, before the code of tomorrow's world is written by a few.

Countering Terrorism in India

This editorial is based on "Act of evil: On the Delhi blast", which was published in The Hindu on 12/11/2025. The article discusses how the deadly car blast near the Red Fort in Delhi, linked to terrorism, underscores the necessity of a comprehensive counter- terrorism approach that combines strong law enforcement, rapid investigation, and the promotion of social harmony to protect India's unity and peace.

Tag: GS Paper - 3, Terrorism in Hinterland & Border Areas, Linkages of Organised Crime with Terrorism, Cyber Security, Security Challenges & their Management in Border Areas.

The **deadly car blast** near **Delhi's iconic Red Fort** on **November 10, 2025 November 10, 2025**, has thrust **India's national security concerns** into sharp focus. The **Delhi Police** has registered an **FIR under the Unlawful Activities (Prevention) Act (UAPA),1967** and launched an **intensive probe**, suspecting the involvement of **organized terror networks**. The challenge lies in swiftly **unravelling terror networks** while **fostering unity** in a **diverse society** vulnerable to **divisive forces**. It highlights the **urgent need** for a **comprehensive counterterrorism strategy** that integrates **strong intelligence coordination**, **proactive policing**, and **advanced forensic capabilities**.

How does Terrorism Persist as a Threat to India's Internal Security and Strategic Interests?

- **Cross-border Terrorism and Insurgency:** India's **long-standing challenge** with **cross-border terrorism**, especially **emanating from Pakistan**, remains significant.
  - Groups such as **Lashkar-e-Taiba (LeT)** and **Jaish-e-Mohammed (JeM)** continue to orchestrate attacks in **Jammu & Kashmir** and beyond.
  - **Recent incidents**, including the **April 2025 Pahalgam attack**, underscore the **persistent infiltration threat** despite **enhanced border security**.
    - According to data from the **Ministry of Home Affairs (MHA)**, India witnessed around **7,217 terrorist incidents between 2004 and 2014**, which declined sharply to **approximately 2,242 incidents during 2014–2024**, reflecting a significant improvement in the internal security situation.
  - However, despite this decline, **cross-border terrorism remains a persistent challenge**, with **continued infiltration attempts and proxy operations** from Pakistan-based groups posing a serious threat to India's **long-term internal security and regional stability**.
- **Urban Terrorism and Symbolic Attacks:** The **2025 Red Fort car blast** reflects a **rising trend of urban terrorism** targeting **symbolic national sites** to create **psychological impact**.
  - The use of **ammonium nitrate explosives** and urban anonymity exposed gaps in **civil security infrastructure**.
  - Emerging forms like **white-collar terrorism**, involving **educated professionals** such as **Umar Nabi**, linked to **Pakistan-based terror outfits**, highlight how **technical expertise**, **financial access**, and **digital networks** are exploited.
  - Strengthening **urban security architecture** against **networked and white-collar terror threats** is crucial for national resilience.
- **Domestic Radicalization and Ideological Polarization:** The rise of **homegrown terrorists**, cultivated through **local grievances** and **online propaganda**, presents a less visible but equally perilous risk.

- Recent assessments have indicated a **notable rise in arrests linked to domestic radicalization** across several Indian states, including **Kerala, Maharashtra, and Jharkhand**, reflecting the **growing threat of homegrown extremism**.
- The **decentralization of terror cells** complicates monitoring and prevention, demanding **community vigilance** and **tailored deradicalization programs**.
- **Terrorism often exploits socio-religious divisions to incite instability**, leading to a surge in **communal violence** following major attacks.
  - In **2024**, India witnessed **59 communal riots**, marking an **84% increase** from **32 incidents in 2023**, reflecting the **growing link between terror activities and communal polarization**, according to the **Centre for Study of Society and Secularism**.

Maritime Security Threats: India's **7,500 km coastline** and **strategic ports** face rising **maritime terrorism threats**. **Non-state actors** exploit vulnerabilities for **smuggling arms, explosives, and operatives**.

- **Indian Navy intelligence (2024)** revealed attempts by **terrorist operatives** to gain **maritime access** via **illicit shipments** in the **Arabian Sea**.
- The **infiltration of arms through sea routes** demands **increased naval patrolling**, **coastal surveillance**, and **international maritime cooperation**.

Cyberterrorism and Emerging Technologies: Terrorist groups increasingly use **cyber tools**—including **encrypted communication**, **data theft**, and **social media propaganda**—raising the threat of **cyberterrorism**.

- The **National Cyber Security Coordinator's 2025 report** noted terror groups deploying **ransomware** and **phishing campaigns** to **disrupt infrastructure** and **recruit online**.
- The use of **drones** in **northeastern insurgencies** illustrates how **technology is reshaping terrorism**.
- Diversified **terror tactics** now include potential **chemical and biological attacks**.
- A **foiled 2025 plot** in **Uttar Pradesh** involving **chemical agents** highlights terrorists' attempts to acquire **unconventional weapons**.

Intelligence and Coordination Gaps: India's **intelligence network** comprises more than **20 agencies**, including the **Research and Analysis Wing (RAW)**, **Intelligence Bureau (IB)**, **National Technical Research Organisation (NTRO)**, and **National Investigation Agency (NIA)**, each with **distinct operational mandates**.

- However, issues such as **fragmented data sharing**, **overlapping jurisdictions**, and **siloed functioning** often weaken collective efficiency.
- Although the **Multi-Agency Centre (MAC)** was established to facilitate **inter-agency intelligence exchange**, it continues to operate under **executive orders** rather than a **statutory framework**, resulting in **limited transparency and accountability**.
- Furthermore, **inadequate technological training** among **state police forces** and the **uneven use of modern data analytics tools** hinder **real-time threat detection and response**.

Hybrid Warfare and Proxy Conflicts: India faces **hybrid warfare**, where **state and non-state actors** employ **covert, proxy, and cyber tactics** to destabilize.

- The **China-Pakistan nexus** in **fostering insurgencies** exemplifies this **new-age hybrid threat**.
- **Indian Army operations** in border regions underscore the need for **adaptability**, **intelligence modernization**, and **strategic preparedness**.

What are the Key Elements of India's Counterterrorism Security Framework?

Legal and Policy Framework:

- **Unlawful Activities (Prevention) Act (UAPA), 1967:** The primary anti-terror legislation empowering the government to **ban terrorist**

organizations, **seize assets**, and **designate individuals as terrorists**.

- It provides the **legal foundation** for prosecution and preventive detention.

- **National Investigation Agency (NIA) Act, 2008:** Created post the **26/11 Mumbai attacks**, the NIA investigates **terrorism-related offences** across states, ensuring a **centralized, specialized probe mechanism**.
- **National Security Act (NSA), 1980:** Enables **preventive detention** of individuals threatening national security or public order.
- **Policy Initiatives:** Frameworks like the **National Counter Terrorism Strategy**, **National Security Policy (Draft)**, and **Counter Radicalization Guidelines** focus on **prevention, deterrence, and capacity building**.

Institutional Mechanisms:

- **National Security Council Secretariat (NSCS):** Headed by the **National Security Advisor (NSA)**, it coordinates inter-agency responses, formulates security strategies, and integrates **defense, intelligence, and diplomacy**.
- **Multi-Agency Centre (MAC):** Established under the **Intelligence Bureau (IB)** in 2001, it serves as a **real-time intelligence-sharing hub** linking **central and state intelligence units** to prevent lapses in threat detection.
- **National Technical Research Organisation (NTRO):** A **technical intelligence agency** under the NSA, focusing on **cyber threats, satellite intelligence, and signal interception**.
- **Defence Intelligence Agency (DIA):** Coordinates **military intelligence** from Army, Navy, and Air Force, ensuring synergy between **civilian and defense intelligence frameworks**.

Security Forces and Operational Units:

- **National Security Guard (NSG):** India's elite **counterterrorism and hostage-rescue force**, established post the **1984 Operation Blue Star**, and known for **swift response** in urban terror situations.
- **Central Armed Police Forces (CAPFs):** Forces like **CRPF, BSF, ITBP, and CISF** are vital in **border management, internal security**, and **critical infrastructure protection**.
- **Anti-Terrorism Squads (ATS):** State-level specialized units coordinate with central agencies for **localized counterterrorism operations** and intelligence inputs.
- **Special Forces and Commandos:** Units like **Para SF**, **MARCOS**, and **Garud Commandos** handle **covert operations, cross-border responses**, and **anti-hijack missions**.

Intelligence and Surveillance Network:

- **Intelligence Bureau (IB):** India's **domestic intelligence agency**, engaged in **counterintelligence, infiltration tracking**, and **internal threat assessment**.
- **Research and Analysis Wing (R&AW):** Responsible for **external intelligence**, particularly on **cross-border terrorist networks** and **state-sponsored terrorism**.
- **NATGRID (National Intelligence Grid):** Integrates data from **21 databases** (banking, immigration, telecom, etc.) to enable **real-time information access** for authorized agencies.
- **Cyber Security Division:** Strengthened through the **Indian Cyber Crime Coordination Centre (I4C)** and **CERT-In**, countering **cyberterrorism and online radicalization**.

United Nations' Counter-Terrorism Strategy

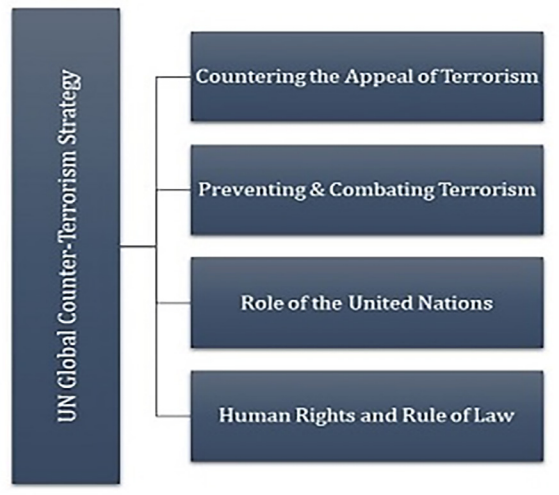
About: The **United Nations Global Counter-Terrorism Strategy**, adopted unanimously in **2006**, marks the first comprehensive global framework aimed at enhancing both **national and international efforts** to combat terrorism while upholding **human rights** and the **rule of law**.

Four Pillars of the Strategy:

- **Addressing conditions conducive to terrorism** – focusing on eliminating socio-political and economic factors that foster extremism.

- **Preventing and combating terrorism** – through intelligence sharing, law enforcement cooperation, and denial of safe havens.
- **Building state capacity and strengthening UN coordination** – promoting cooperation among global and regional organizations.
- **Ensuring respect for human rights and the rule of law** – reinforcing that counterterrorism efforts must align with fundamental freedoms.

- **The Strategy** urges **all UN Member States** to:
  - Refrain from **associating terrorism** with any religion, nationality, or ethnicity.
  - Deny **financial, logistical, or operational support** to terrorist networks.
  - Strengthen domestic legal frameworks and border controls to prevent cross-border terrorism.
- **Institutional Framework:**
  - To facilitate implementation, the **Counter-Terrorism Implementation Task Force (CTITF)** coordinates efforts among **over two dozen UN entities**, including **INTERPOL, UNDP, and the Office of the High Commissioner for Human Rights**.
  - The CTITF supports **capacity-building**, **technical assistance**, and **policy coherence** for member states.



What Measures are Required to Ensure a Comprehensive Counterterrorism Policy in India?

- **Enhance Inter-Agency Coordination and Intelligence Sharing:** India must institutionalize a **robust, centralized intelligence-sharing ecosystem** through **expanded fusion centers** and **real-time data integration**.
  - The **Multi-Agency Centre (MAC)** has become a **key pillar** of India's **counterterrorism architecture**, facilitating **real-time intelligence exchange** and **coordinated multi-agency operations**.
  - Building on this foundation, the creation of **National Fusion Centers** and the strengthening of **State-level counterparts** will help **minimize bureaucratic delays** and enable **swift, unified responses**.
  - Through operations such as **Project Sindoor** and **Operation Black Forest**, the government aims to shift from a **reactive system** to a **proactive and preventive security framework**, ensuring **faster and more integrated counterterror responses** across the nation.
- **Leverage Advanced Technology and Cybersecurity:** To keep pace with evolving terror tactics, India must expand the use of **AI**, **machine learning**, and **predictive analytics** for **surveillance** and **threat assessment**.
  - The **2025 India-EU counter-drone training** led by the **National Security Guard (NSG)** exemplifies successful adoption of **cutting-edge technology**.
  - **CERT-In's proactive cyber defense** should be enhanced to protect **critical infrastructure** from **cyberterrorism**, while **countering online radicalization** and **recruitment**.
- **Strengthen Legal Framework and Fast-Track Judicial Processes:** Modifying laws like the **Unlawful Activities (Prevention) Act (UAPA)** is vital to address **emerging threats** and the complexities of **modern terrorism**, while ensuring **safeguards against misuse**.

- Establishing **special anti-terrorism courts** will **expedite trials**, improving **conviction rates** and **deterrence**, as seen after the **Pulwama** and **Pathankot attacks**, where **swift trials** proved crucial.
- India must tighten **laws** and **enforcement mechanisms** to block **terror financing channels**, aligning with **FATF standards**.
  - Enhanced **cyber surveillance** and **private-sector collaboration** are vital to trace **cryptocurrency misuse** and **online funding platforms** exploited by **terror networks**.

- **Upgrade Border and Maritime Security:** India's security architecture must include **multi-layered infrastructure**—such as **smart fencing**, **thermal imaging**, and **coastal radar systems**—supported by **enhanced naval and paramilitary patrols**.
  - Regional cooperation through **BIMSTEC** and the **Indian Ocean Rim Association (IORA)** is essential for **maritime surveillance**, **anti-smuggling**, and **trade route protection**.
  - Frequent, **joint counterterrorism exercises** involving multiple agencies improve **response efficiency** and **interoperability**.
- **Deepen International and Regional Security Cooperation:** Active participation in **SCO**, **G20**, and the **UN Global Counter-Terrorism Forum** facilitates **intelligence sharing**, **joint operations**, and **policy harmonization**.
  - **Bilateral initiatives** like the **India-Egypt Joint Working Group** demonstrate the value of **strategic partnerships** in tackling **transnational terror networks** and **terror financing**.
  - Beyond **military measures**, India should continue to employ **diplomatic pressure** and **economic sanctions** to **isolate terror sponsors** and **state actors** supporting terrorism.
    - **Operation Sindoor** combined **strategic strikes** with **diplomatic engagement**, ensuring **global support** and reinforcing **deterrence** without escalation.
- **Promote Community Engagement and Counter-Radicalization:** Drawing from **Singapore** and **Norway's models**, India should expand **community-centered programs** to address **socio-economic grievances** and **ideological vulnerabilities**.
  - **Educational outreach**, **vocational training**, and **rehabilitation initiatives** for **at-risk populations** will strengthen **societal resilience** and curb **extremist recruitment**.
  - India's existing initiatives, such as the **National Counter Terrorism Centre's community engagement programs** and **Skill Development schemes for vulnerable youth**, can be **expanded and made more culturally sensitive** by **integrating international best practices**, thereby strengthening **grassroots resilience and counter-radicalization efforts**.

Conclusion:

As scholar **Bruce Hoffman notes, *"Terrorism is the deliberate creation and exploitation of fear through violence or the threat of violence in the pursuit of political change."*** To effectively counter such threats, India must strengthen **inter-agency coordination**, enhance **technological capabilities**, and **fast-track judicial processes** while fostering **community resilience** through **inclusive counter-radicalization programs**. The **way forward** lies in **sustained political will**, **resource commitment**, and **embracing global best practices** to **secure peace** and **uphold democratic values** amidst the **dynamic threat landscape**.

Strengthening India- Sri Lanka Ties

This editorial is based on "Fishing troubles: On India, Sri Lanka, the Palk Bay fishing issue", which was published in The Hindu on 12/11/2025. The article discusses the longstanding India-Sri Lanka fishing dispute in Palk Bay, highlighting ecological damage, economic losses, legal complexities, and the need for sustainable, cooperative solutions to resolve conflicts between fishermen of both countries.

Tag: GS Paper 2, India and its Neighbourhood, Groupings & Agreements Involving India and/or Affecting India's Interests, Effect of Policies and Politics of Countries on India's Interests

The **Palk Bay fishing dispute** between **India and Sri Lanka** highlights a conflict between **traditional livelihoods** and **environmental sustainability**. Recent **arrests of fishermen** and the use of **destructive bottom trawling** have harmed **marine ecosystems** and strained ties. Resolving this issue requires **sustainable fishing practices**, **joint resource management**, and **diplomatic engagement**. The future of **bilateral relations** depends on **trust-building**, **strategic cooperation**, and a shared commitment to **regional stability.**

What is the Significance of the India-Sri Lanka Relationship?

- **Historical and Civilizational Linkages:** India and Sri Lanka share **2,500 years of cultural and civilizational ties**, rooted in **Buddhism, language, and trade**.
  - **Emperor Ashoka's son, Mahinda**, introduced Buddhism to Sri Lanka in the 3rd century BCE — a bond still symbolised through **Buddhist pilgrimages and relic exchanges**.
  - Shared linguistic and ethnic connections exist between **Tamil Nadu and Northern Sri Lanka**, fostering cultural continuity.
- **Strategic and Geopolitical Importance:** Sri Lanka's location near the **major sea lanes of communication (SLOCs)** in the **Indian Ocean** gives it immense **strategic relevance** for India's **maritime security**.
  - The island sits close to India's southern coast (just **30 km across the Palk Strait**), making **stability in Sri Lanka crucial for India's security architecture**.
  - Cooperation through the **Colombo Security Conclave (CSC)**, involving **India, Sri Lanka, the Maldives, and Mauritius**, strengthens regional counter-terrorism and maritime surveillance efforts.
- **Economic and Trade Relations:** The **economic and trade relations** between India and Sri Lanka remain robust, with **bilateral merchandise trade reaching USD 5.54 billion in FY 2023–24**.
  - Of this, **India's exports to Sri Lanka amounted to USD 4.11 billion**, while **Sri Lanka's exports to India stood at USD 1.42 billion**, reflecting India's position as a major trading partner and highlighting the existing trade imbalance between the two nations.
  - **India is among the largest FDI contributors**, with **USD 2.25 billion cumulative investment till 2023**.
  - **Economic and Technology Cooperation Agreement (ETCA)** negotiations resumed in **October 2023**, aiming for **deeper trade and investment integration**.
  - Sectors like **energy, pharmaceuticals, and IT** are expanding under India's **'Neighbourhood First'** policy.
- **Development and Humanitarian Assistance:** India has extended **USD 6 billion in credit** and **USD 780 million in grants** for projects in **housing (60,000 units), education, healthcare, and renewable energy**.
  - During Sri Lanka's **2022 economic crisis**, India provided **USD 4 billion** through **credit lines, currency swaps, and humanitarian aid**, reinforcing **trust and goodwill**.
    - Also, India became the ***first country*** to assure the **IMF** of its **debt restructuring support** to **Sri Lanka(ORF)**
  - People-centric projects cover **all provinces**, ensuring **inclusive development**.
- **Defence and Security Cooperation:** Marked by a **landmark 5-year Defence MoU signed in 2025**, structuring **joint exercises (SLINEX, MITRA SHAKTI)**, **maritime surveillance**, **training**, and **cooperation in defence technology**.
  - **Indian Navy's Dornier aircraft** operate in **Sri Lanka for maritime surveillance**; **India offers around 1200 training vacancies annually** for **Sri Lankan armed forces**.
  - **India has played the role of first responder** during **environmental disasters** in **Sri Lankan waters (MV XPress Pearl, MT New Diamond)** and collaborates on **counter-terrorism through the Colombo Security Conclave.**

- **Connectivity and People-to-People Contact: Ferry services (Nagapattinam–Kankesanthurai, 2023)**, **Chennai–Jaffna flights (2022)**, and **UPI-based digital payments (2024)** enhance connectivity.
  - **India is Sri Lanka's largest tourist source**, accounting for **over 4.16 lakh arrivals in 2024 (~20%)**.
  - Initiatives like **'Study in India'** and **ITEC scholarships** foster educational exchanges.
  - Projects like the **Indian Gallery at the International Buddhist Museum** and the **restoration of historical temples** reinforce **Buddhist heritage diplomacy**.
  - Joint celebration of Vesak Day and translation of **Jataka Tales into Sinhala** promotes cultural harmony.

What are the Major Challenges Affecting India–Sri Lanka Relations Today?

- **Fishermen Dispute:** The Katchatheevu Island dispute persists, with Indian fishermen allowed only **limited access for non-fishing activities** despite **sovereignty resting with Sri Lanka**.
  - Over **500 Indian fishermen** were **arrested by Sri Lankan authorities in 2024** alone for alleged **fishing violations** in Sri Lankan waters.
  - In 2024, **Sri Lanka confiscated 71 Indian fishing boats**, which were subsequently **nationalised under the provisions of the 2018 law**, reflecting the continuing tensions over **fishing rights and maritime boundary violations** in the Palk Bay **region**.
  - Bottom trawling by Indian **mechanised fleets** damages **coral reefs and shrimp habitats** in **Palk Bay**, **banned in Sri Lanka since 2017**.
    - These **ecological impacts** threaten the **livelihoods of small-scale fishermen** in **Sri Lanka's Northern Province** and **fuel cross-border tensions**.

- **Chinese Strategic Influence: China's control over Hambantota Port**, under a **99-year lease since 2017**, symbolizes **deepening Chinese presence** in **Sri Lanka's strategic maritime space**, causing **Indian security concerns** about **China's military intentions**.
  - **Frequent sightings of Chinese naval and surveillance vessels** near **Sri Lanka and Indian Ocean waters** aggravate **India's strategic vigilance**.
  - **Chinese infrastructure loans** and **Belt and Road Initiative (BRI) projects** in Sri Lanka raise **debt-trap diplomacy worries** for Sri Lanka and **geostrategic challenges** for India.
- **Domestic Political Instability in Sri Lanka: Frequent changes in Sri Lankan leadership** since the **2022 economic crisis** create **uncertainties in policy continuity,** affecting **bilateral projects** such as **port development, connectivity initiatives, and energy cooperation**.
  - **Political instability** delays **project implementation** and complicates **India's strategic planning**.
- **13th Amendment and Tamil Ethnic Issue: Slow and partial implementation of the 13th Amendment** post-civil war restricts **meaningful devolution of power** to the **Tamil-majority Northern and Eastern provinces**.
  - **Tamil Nadu political actors** actively advocate for **Sri Lankan Tamil rights**, influencing **India's foreign policy** and complicating **bilateral conversations**.
  - **Ethnic reconciliation** and **political autonomy** remain **sensitive issues**, necessitating **careful diplomatic balancing**.
- **Trade Imbalance and Economic Cooperation: India's merchandise exports to Sri Lanka** stood at **USD 4.11 billion in FY 2023-24**, while **Sri Lankan exports to India** were **USD 1.42 billion**, contributing to **domestic criticism** in Sri Lanka regarding **trade deficits**.
  - Negotiations on the **Economic and Technology Cooperation Agreement (ETCA)** have **resumed after five years**, aiming to **facilitate trade and investments** but face **resistance** over perceived **economic sovereignty concerns**.
- **Local Resistance to India's Growing Role in Sri Lanka**: Some Sri Lankan groups perceive India's dominant economic and strategic presence as intrusive, fostering nationalist backlash.
  - **Infrastructure projects** like **land bridges** or **Indian investments in the Northern Province** face **local resistance** due to concerns over **sovereignty and local economic control**.
- **Maritime Border Security and Smuggling: Porous maritime boundaries** facilitate **narcotics trafficking, unauthorised immigration, and illegal smuggling activities**, posing **security threats**.
  - Both nations continue **joint efforts** to enhance **maritime surveillance** and **coastal security** but face **operational challenges**.
  - For instance, in **2021**, the **Indian Coast Guard** intercepted a **Sri Lankan trawler** near **Vizhinjam, Kerala**, seizing **300 kg of heroin**, **five AK-47 rifles**, and **1,000 rounds of ammunition**.

What Major Foreign Policy Initiatives has India Undertaken to Deepen Ties with Its Neighbours?

- **Neighbourhood First Policy:** The policy emphasises **stronger physical, digital, and cultural connectivity** with neighbouring countries such as **Bhutan, Nepal, Sri Lanka, Maldives, Myanmar, Bangladesh, and Afghanistan**.
  - It is guided by the principles of **respect, dialogue, peace, and prosperity**, with **India's support spanning from major infrastructure initiatives to grassroots development projects**.
- **Act East Policy:** The **Act East Policy**, upgraded in **2014** from the earlier **Look East Policy**, broadens **India's engagement with Southeast Asia and the Indo-Pacific**.
  - With **ASEAN at its core**, the policy promotes **economic partnerships, cultural exchanges, and security cooperation**.
  - India has simultaneously **strengthened bilateral ties** and taken an **active role in regional forums** such as the **East Asia Summit**, **QUAD**, and **ASEAN Defence Ministers Meeting Plus**, reinforcing its strategic and diplomatic presence in the region.
- **Security and Growth for All in the Region (SAGAR) Initiative:** Launched in **2015**, **SAGAR** aims to strengthen India's **maritime cooperation** and **security engagement** with **Indian Ocean littoral states**.
- **BIMSTEC and SAARC Revitalisation:** India pushes for revitalising regional groupings like **SAARC** and promoting **sub-regional cooperation** through **BIMSTEC** with **institutionalised summits** and **dialogues** to foster **structured**, **predictable**, and **sustained regional diplomacy**.
- **Digital Diplomacy and Connectivity:** India has introduced **cross-border digital payment interoperability** (e.g., **UPI acceptance by Nepal**), shares open-source governance platforms, and promotes capacity building in cybersecurity to build tech-enabled, people-centric regional connectivity and economic integration.
- **Defence and Strategic Partnerships:** Initiatives like **joint military exercises**, **capacity building** in **defence manufacturing** under **'Innovation for Defence Excellence (iDEX)'**, and **security cooperation** with neighbours enhance **regional stability** and counter **external influences**.
- **Development Partnership and Humanitarian Assistance:** India remains the **largest development partner** in the region, providing **credit, grants, disaster relief, vaccines, and evacuation support** during crises. (e.g., **2015 Nepal earthquake aid**, **COVID-19 vaccine sharing, Operation Ganga**).

What Steps Should India Adopt to Strengthen its Bilateral Relationship with Sri Lanka?

- **Institutionalise Sustainable Fisheries Cooperation: India should establish a robust bilateral fisheries management mechanism** with **Sri Lanka**, incorporating **joint patrolling**, **regulated shared fishing zones**, and **fisherfolk livelihood support**.
  - Following models like the **EU's Baltic Sea fisheries framework**, this would **reduce arrests and ecological harm**.
  - **India could provide subsidies and training** to fishermen transitioning from **bottom trawling to deep-sea fishing**, encouraging **sustainable practices** and **reducing cross-border tensions**.
- **Counterbalance External Influence through Strategic Defence Partnership:** Building on the **landmark 5-year Defence MoU signed in 2025**, **India must enhance joint maritime patrols, intelligence sharing, and capacity building** in **Sri Lanka's navy** to **safeguard regional security**.
  - Offering **defense platforms and disaster response training** strengthens **maritime domain awareness**.
  - These efforts must **counterbalance China's growing footprint** in **Sri Lanka's strategic infrastructure** while **respecting Sri Lankan sovereignty**.
- **Accelerate Political and Ethnic Reconciliation Support: India should support the full, genuine**

implementation of Sri Lanka's 13th Amendment through **diplomatic channels** and back **multi-stakeholder reconciliation forums**.

- Engagement with **Tamil Nadu's political representatives** alongside **Sri Lankan stakeholders** can create **inclusive dialogue pathways**, thereby **easing ethnic tensions** and ensuring **India's regional stability interests**.

- **Revitalise Trade and Investment Frameworks: India should expedite finalization of the Economic and Technology Cooperation Agreement (ETCA)** talks with Sri Lanka, ensuring **equitable access** and addressing **Sri Lankan concerns over trade imbalances** through **phased liberalization and safeguards**.
- Facilitating **INR–LKR trade settlements** and mobilizing **investments in key sectors** such as **energy, tourism, and digital economy** will **boost Sri Lanka's economic growth** and **bilateral commercial ties**.
- **Support Sri Lanka's Economic Recovery and Infrastructure Development : India must continue robust development cooperation** with **concessional loans, grants, and technical assistance** in ongoing projects like the **Indian Housing Project** and **renewable energy initiatives**.
  - **Jointly developing ports like Kankesanthurai** and facilitating **ferry services** will enhance **connectivity and economic hubs**.
  - **Transparent project monitoring** ensures **impact and Sri Lanka's fiscal sustainability**.
- **Expand Capacity Building and Digital Governance Collaboration :** Leveraging **India's success with digital public infrastructure**, India should **accelerate support for Sri Lanka's Unique Digital Identity (SLUDI) project** and **Digital Public Infrastructure rollout**.
  - **Scaling training of civil servants (1500 over five years)**, **STEM educators**, and **health professionals** nurtures **human capital** for **Sri Lanka's modernisation**.
  - Expanding **higher education and research collaborations** will deepen **institutional ties**.
- **Promote People-to-People and Cultural Exchanges: India should intensify cultural diplomacy**, supporting the **restoration of heritage sites** and enhancing **tourism promotion,** given that **India is Sri Lanka's largest tourist market**.
  - Expanding **air connectivity**, **cultural exchange programs**, **scholarships**, and **joint Buddhist pilgrimages** will **deepen social bonds**, reducing **perceptions of imbalance** and **fostering goodwill** between societies.

Conclusion:

As scholar **Joseph Nye** noted, ***"Soft power is not coercion but attraction, persuasion, and appeal."*** India's engagement with Sri Lanka exemplifies this principle through a blend of **diplomacy, development assistance, and cultural partnership**. Going forward, India must **strengthen cooperation** in areas such as **sustainable fisheries management, economic integration, and regional security**, while promoting **ethnic reconciliation and people-to-people connections**.

India'S Push Toward Deeper Economic Self-Reliance

This editorial is based on " Real message of Trump-Xi G2: India must focus on atmanirbharta", which was published in The Indian Express on 13/11/2025. The Trump-Xi G2 summit signals that India can no longer assume unwavering US support and must adopt a pragmatic multi-aligned strategy rooted in economic self-reliance and stronger national power to safeguard its interests in a shifting global order.

Tag: GS Paper 3, Industrial Policy, Industrial Growth, Planning, Mobilisation of resources, Infrastructure, GS Paper 2, Skill Development, International Relations, Groupings & Agreements Involving India and/or Affecting India's Interests

In 2025, India faces a transformative moment in its foreign policy amid unprecedented global shifts, including the **recent warming of US-China ties** highlighted by the **Trump-Xi G2 summit**. With **traditional assumptions of unwavering US support challenged**, India must navigate

a **multipolar world** marked by **economic dependencies**, **regional tensions**, and **evolving global alliances**. This new landscape demands a **multi-aligned, pragmatic approach** anchored in **economic self-reliance (Atmanirbharta)**, **technological innovation**, and **expanded strategic partnerships** to safeguard national interests and **assert India's growing global role**.

What Key Drivers are Fueling the Momentum of Economic Self-Reliance in India?

- **Manufacturing and Industrial Growth:** The Production Linked Incentive (PLI) Scheme, with an outlay of **₹1.97 lakh crore**, covers **14 crucial sectors** such as **electronics, pharmaceuticals, medical devices, telecom, automobiles, speciality steel, drones, and food processing**.
  - **PLI Scheme incentivises domestic production**, **attracts investments**, and **boosts exports**, generating **jobs** and fostering integration into **global value chains**.
  - The National Manufacturing Mission (NMM), launched in the **Union Budget 2025-26**, provides support for **capacity building** and **technological adoption** to scale manufacturing in **priority sectors**.
- **Accelerating Progress in Agriculture:** The Mission for Aatmanirbharta in Pulses **(2025-2031)** aims to achieve **self-sufficiency** by enhancing **domestic pulse production**, reducing **import dependence**, and ensuring **nutritional security**. The government ensures **minimum support prices** and procurement through **NAFED**.
  - The **Agriculture Infrastructure Fund (₹1 lakh crore)** finances **farm-gate infrastructure**, **aggregation points**, and **supply chains** to empower farmers and improve **market linkages**.
  - **PM Kisan Samman Nidhi** and allied schemes provide **direct income support**, while the emphasis on **fertiliser self-reliance** reduces **import vulnerability**.
- **Healthcare and Pandemic Preparedness:** The Prime Minister Atmanirbhar Swasth Bharat Yojana (PMASBY), with an outlay of **₹64,180 crore**, strengthens **healthcare infrastructure**, including **rural health and wellness centres**, **public health emergency surveillance**, and **laboratory networks**.
  - Strengthening of the **pharmaceutical industry** through the Strengthening of Pharmaceuticals Industry Scheme (SPI) with **₹500 crore** budget and **PLI schemes** aims to reduce **import dependence** on **critical pharmaceutical ingredients** and **devices**.
- **Technology and Digital Sovereignty:** India plans to roll out **Made in India semiconductor chips** by the end of **2025**, bolstering its **semiconductor** and **electronics manufacturing ecosystem**.
  - The **Unified Payments Interface (UPI)** processes over **650 million transactions daily**, fostering **financial inclusion**.
  - Investments in **AI**, **cyber security**, and **digital infrastructure** underpin the drive for **tech autonomy**.
- **Energy and Resource Security:** Ambitious **renewable energy targets** led to India crossing **50% clean energy capacity** by **2025**.
  - Missions targeting **critical minerals exploration** and **deepwater resources** support **energy independence** and industrial **raw material security**.
- **Defence Sector Autonomy:** India increased **FDI limits** in **defence manufacturing** from **49% to 74%**, significantly expanding **indigenous production capacities** and reducing **import dependence**.
  - Its focus on **indigenous jet engine development** and **local supply chains** enhances **strategic autonomy**.
- **MSME and Business Empowerment:** Measures include **collateral-free automatic loans** up to **₹3 lakh crore**, **corpus funds** for MSME **equity support**, and **subordinate debt plans** to revive **stressed units**.
  - Newly introduced **simplified MSME classification** increases eligible units for benefits.
    - **Tax reductions**, such as lowered **TDS and TCS rates**, improve **liquidity** and **ease of doing business**.

- **Privatisation policy reforms** in **Public Sector Enterprises** aim to improve **competitiveness** while retaining **strategic sectors**.

- **Enhanced Push for Employment Generation:** The Atmanirbhar Bharat Rozgar Yojana incentivizes job creation in formal sectors.
  - Expanded funding for **MGNREGA** supports **livelihood security** for rural poor while boosting **rural economies**.
  - Skill India Mission trains millions annually to meet **industry skill demands**.
  - Startup India fosters **entrepreneurship**, creating **jobs** and **innovation**.
  - Prime Minister's Employment Generation Programme (PMEGP) supports **micro-enterprises** driving **self-employment**.

Which Structural Barriers Continue to Hinder India's Journey Toward Economic Self-sufficiency?

- **Labor Market Rigidity and Low Workforce Engagement:** India's **workforce engagement rate** dropped from **24% (2024)** to **19% (2025)**, the **steepest global decline**.
  - The labor market remains **rigid**, with **complex labor laws**, **80% informal workforce**, limited **social security**, and weak **skills development**. **Low engagement** curtails **productivity** and **formal job creation**.
  - **On-site workers** show higher engagement (21%) than **hybrid (19%)** and **remote (8%)** workers; **youth engagement** (18–26 years) is lowest at **15%**.
- **Skills Mismatch and Education–Employment Gap:** Only **8.25% of graduates** work in roles suited to their qualifications; many occupy **low-skilled jobs**.
  - A **51% talent gap** exists in emerging tech like **AI**. India faces high **youth unemployment (10.2%)**, with **female unemployment** at **20.1% in urban areas**. This mismatch slows **advanced manufacturing adoption** and reduces **productivity**.
- **Complex Land Acquisition Processes: Legal complexity** and **community resistance** delay **land acquisition** for industrial and infrastructure projects.
  - For instance, **the POSCO steel plant project in Odisha** , once one of the largest proposed FDI projects, was **stalled for years due to land acquisition** issues and local resistance, eventually leading to the company's withdrawal.
  - These delays raise **project costs**, deter **investors**, and hinder **manufacturing expansion**, contributing to a stagnant **percentage of manufacturing share of GDP**, lower than competitors.
- **Inadequate Infrastructure and High Logistics Costs:** Persistent inefficiencies in **power**, **transport**, **warehousing**, and **ports** contribute to **India's logistics costs (about 7.97% of GDP for 2023-24,** a significant improvement from earlier estimates of 13–14%).
  - Despite progress, challenges such as **operational bottlenecks in rail transport**, **uncontrolled pricing in road freight**, and **inadequate infrastructure at regional airports** remain.
  - High costs reduce **competitiveness** and disrupt **supply chains**, slowing export growth.

- **Complex Regulatory Environment and Protectionism:** High **tariff rates** and **complex regulations** restrict India's **global value chain integration**.
  - India's **global trade share** remains low at **1.8%**. Over-reliance on **protectionism** can stall **innovation** and **market diversification**.
  - Despite reforms, **MSMEs**, which contribute **30% of GDP**, face challenges in accessing **affordable, long-term credit** due to **high borrowing costs** and **collateral requirements**.
  - Reforms in **labor**, **land**, and **capital markets** are slow due to **political hesitancy** and **social resistance**.
    - **Fragmented state-level implementation** weakens a unified, **business-friendly environment**, slowing **manufacturing growth** and **investment momentum**.
- **Global Geopolitical Volatility and Supply Chain Risks:** India's dependence on external supply chains, especially for critical goods, exposes it to global shocks.
  - During the **Covid-19 pandemic,** India faced severe disruptions in API (Active Pharmaceutical Ingredients) imports, **70% of which came from China**.
  - Overreliance on a few countries for essential technologies, defense hardware, and semiconductors weakens national security.
    - India imports **over 90% of its semiconductor needs**, making domestic chip fabrication a strategic imperative.
  - India imports **over 85% of its crude oil** and **over 50% of its natural gas**, making energy security vulnerable to global price fluctuations and geopolitical crises.

What are the Significant Accomplishments of the Make in India Initiative?

- **Global Vaccine Leadership:** Powered by indigenous vaccine production, India achieved rapid nationwide COVID-19 vaccination and emerged as a major global supplier—producing **60% of the world's vaccines**, meaning **every second vaccine globally is made in India**.
- **Vande Bharat Trains:** India's first indigenous semi-high-speed trains exemplify advanced domestic engineering.
  - **102 Vande Bharat services (51 trains)** are operational, showcasing India's rising capability in **modern rail technology**.
- **Defence Self-Reliance:** The commissioning of **INS Vikrant**, India's first indigenous aircraft carrier, marks a major leap in defence manufacturing.
  - Defence production reached **₹1.27 lakh crore in 2023–24**, with exports to **90+ countries**.
- **Electronics Manufacturing Boom:** India's electronics industry touched **USD 155 billion in FY23**, with production nearly doubling since FY17.
  - Mobile phone manufacturing now contributes **43%** of total output, with **99% of smartphones produced domestically**, making India the **second-largest mobile manufacturer** globally.
- **Record Merchandise Exports:** India recorded **$437.06 billion** in merchandise exports in **FY 2023–24**, strengthening its position in global trade.
- **Rising Bicycle Exports:** Indian bicycles are in high demand in countries like the **UK, Germany, and the Netherlands**, reflecting strong global trust in Indian engineering.
- **Global Defence Accessories Market: 'Made in Bihar' boots** are now used by the **Russian Army**, highlighting India's expanding footprint in defence-related manufacturing.
- **Kashmir Willow Bats:** Kashmir willow cricket bats have earned global popularity, symbolising India's craftsmanship and cultural influence.
- **Amul's Global Expansion:** Amul has launched its dairy products in the **US market**, showcasing the international appeal of Indian brands and flavours.

- **Massive Job Creation in Textiles:** India's textile sector has generated **14.5 crore jobs**, playing a crucial role in employment and economic growth.
- **Toy Manufacturing Growth:** India now produces **400 million toys annually**, with **10 new toys created every second**, demonstrating rapid expansion in domestic toy manufacturing

What Key Measures are Needed to Strengthen India's Path toward Economic Self-reliance?

- **Labor Market Reform and Skill Development:** India must modernize **labor laws** to enhance **workforce flexibility** and expand **formal employment**, learning from models like **Germany's dual vocational training** which combines education with apprenticeship.
  - The government should scale up targeted **skill development** under the **Skill India Mission** and increase **industry-institute linkages** to bridge the severe **skills mismatch** where only about **8.25% of graduates** work in matching jobs.
  - Increasing **female labor participation** through **safe work environments**, **maternity benefits**, and **flexible work options** is critical given the **22% female engagement rate** and **20.1% female youth unemployment**.
- **Land Acquisition and Infrastructure Enhancement:** Streamlining **land acquisition** through a **unified national act** and **digital land records**, similar to **South Korea's land development model**, will reduce **project delays** and **investment uncertainty**.
  - The Union Budget 2025's **National Manufacturing Mission** and **PM GatiShakti** are important steps forward; these must be accelerated to keep a check on India's **logistics costs**, improve **efficiency**, and boost **export competitiveness**.
- **Simplification of Regulatory Environment and Trade Facilitation: Rationalising tariffs**, simplifying **customs procedures**, and adopting **WTO best practices** will enhance India's **global trade share (1.8%)**.
  - The government should expand the **One Nation, One Ration Card** and **Digital India** initiatives that reduce **compliance burdens**, encourage **entrepreneurship**, and integrate **local producers** into **global supply chains**, aligning with recommendations in committees like the **NITI Aayog** and **Economic Surveys**.
- **Deepening Finance and Capital Markets for MSMEs:** Expanding **institutional credit** with **collateral-free loans**, as under the **Credit Guarantee Fund Scheme**, and introducing **fintech solutions** to deliver **affordable credit** can unlock **MSME growth** (contributing **~30% to GDP**).
  - **Public–private partnerships (PPPs)** can support innovative **financing models** tailored to MSMEs, addressing high **capital costs** which currently restrict **technology adoption** and scaling.
- **Raising Quality and Relevance of Education and Training:** Aligning **curricula** with emergent **sector skills** and expanding **STEM education** will be pivotal.
  - Implementation of the **New Education Policy 2020** must be hastened to improve **vocational training** and **digital literacy**, preparing the workforce for sectors prioritized under **PLI schemes** such as **electronics** and **biotech**.

- Collaboration with **global universities** and **training institutes** will bring **international standards** and **innovative pedagogy**.

- **Promoting Indigenous Innovation and Technology Development:** Investing in **public R&D** and **startups** through schemes like **Innovations for Defence Excellence (iDEX)** and the **Electronics Component Scheme** fosters **cutting-edge technologies** including **semiconductors** and **AI**.
  - India must foster a robust **intellectual property regime** and ease **technology adoption** in manufacturing, drawing inspiration from countries like **Japan's industrial clusters** that integrate suppliers and innovation hubs.
- **Expanding Social Security and Inclusive Growth Measures:** With a large **informal workforce**, India must enhance **social security nets**—including **universal health coverage** as envisaged under the PM Atmanirbhar Swasth Bharat Yojana—and promote **formalization** of **gig** and **contract workers** to support more stable livelihoods.
  - Investment in **rural infrastructure** and **digital connectivity** will reduce **urban–rural disparities**, supporting **inclusive self-reliance**.

Conclusion :

India's **economic self-reliance** is vital to building a **prosperous future**. As PM Modi stated, "**Aatmanirbharta** is the need of the times. **Self-reliance** is the cornerstone of building a **Viksit Bharat**." To realize this vision, India must pursue **labor reforms**, streamline **land acquisition**, simplify **regulations**, deepen **MSME financing**, align **education with industry**, foster **indigenous innovation**, and expand **inclusive social welfare**. This **integrated approach** will empower India to become a **resilient**, **globally competitive**, and **developed nation by 2047**.

India Leads the Clean Energy Shift

This editorial is based on "Gauging the costs for clean energy transition" which was published in The Hindu Business Line on 10/11/2025. The article brings into picture the affordability of the clean energy transition for emerging economies, requiring just $121 billion by 2030, with India leading at $57 billion to raise renewables to 63% of capacity amid sharply falling solar, wind, and battery costs.

Tag: GS Paper - 2, GS Paper - 3, Renewable Energy, Government Policies & Interventions

A new study reveals that the clean energy transition for emerging economies is far more affordable than previously thought. Between **2024 and 2030, nine major G20 emerging markets will need just $121 billion in climate finance for power generation**, merely the incremental cost above business-as-usual investments. India leads this transformation, requiring **$57 billion to boost its renewable share from 45% to 63% of installed capacity.** Dramatically falling costs of solar, wind, and battery storage **down 83%, 42%, and 90% respectively since 2010**, have made this transition economically viable**. For India specifically, while fossil-fuel power investments will decline by $43 billion, renewable spending must increase by $90 billion**, positioning the country at the forefront of the green energy revolution with the largest climate finance requirement among emerging economies.

What are the Major Milestones in India's Transition Towards Renewable Energy?

- **Surpassing the Non-Fossil Fuel Capacity Goal Ahead of Time:** India has already **achieved its COP26 commitment** to have **50% of its installed electricity generation capacity from non-fossil fuel sources**, showcasing exceptional policy effectiveness and rapid execution.
  - This early achievement demonstrates a decoupling of energy growth from carbon-intensive sources, providing strong global confidence in India's net-zero 2070 pathway and enabling further ambitious clean energy targets.
  - As of September 2025, the **installed non-fossil capacity has crossed 250 GW**, representing **over 50%** of the country's total power capacity, successfully meeting the **2030 target five years early**.

- **Global Leadership in Solar Capacity and Manufacturing Growth:** Solar energy is the central pillar of the energy transition, and India is asserting itself as a global solar powerhouse through massive capacity addition and domestic manufacturing support.
  - The success of national schemes and low tariffs, driven by reverse auctions, makes solar the most **cost-competitive and rapidly deployable** source of new power generation, reducing the need for imported fuel.
  - **India's cumulative solar capacity has reached around 130 GW (as of October 2025),** and domestic solar module manufacturing capacity has nearly doubled from 38 GW to **74 GW** in FY 2024–25, driven by the Production Linked Incentive (PLI) scheme.
- **Launch of the National Green Hydrogen Mission (NGHM):** The launch of the National Green Hydrogen Mission marks India's aggressive move to decarbonize **hard-to-abate sectors** like fertilizers, refining, and heavy industries, shifting the focus beyond just the power sector.
  - The mission establishes a comprehensive ecosystem for green hydrogen production and utilization, positioning India as a potential **global hub for green hydrogen export**, which is crucial for long-term energy security.
  - The mission targets developing a Green Hydrogen production capacity of at least **5 Million Metric Tonnes (MMT) per annum by 2030**, which is expected to attract over **₹8 lakh crore** in total investments.
- **Decentralization of Renewable Energy through Rooftop Solar Schemes:** A major shift is the focus on democratizing power generation, moving beyond large utility-scale projects to empower households and farmers as producers of clean energy.
  - The widespread adoption of decentralized solar, particularly rooftop and agricultural pumping, significantly reduces transmission losses, enhances grid resilience, and directly impacts consumer's electricity bills.
  - The PM Surya Ghar: Muft Bijli Yojana, launched in February 2024 with a **₹75,021 crore** outlay, targets rooftop solar installations in **one crore households**.
- **Financial Incentives for Energy Storage:** Recognizing the intermittency challenge of solar and wind, the government has prioritized energy storage, including Battery Energy Storage Systems (BESS) and pumped storage projects (PSP), to achieve a **Round-the-Clock (RTC)** reliable power supply.
  - The introduction of targeted financial mechanisms is essential to bridge the current cost gap, making storage projects viable and facilitating high penetration of variable renewables into the grid.
  - The **Cabinet has approved a Viability Gap Funding (VGF) scheme for BESS**, in September 2023 with an initial allocation to support the development of **4,000 MWh** of BESS projects.
- **Advancing into the Frontier of Offshore Wind Energy:** To diversify the renewable mix and exploit vast untapped potential, India is strategically moving into the high-capacity factor, higher-cost domain of offshore wind, which requires substantial government support.
  - This pioneering step opens a new vector for clean energy, especially along the **coasts of Gujarat and Tamil Nadu**, simultaneously catalyzing a new domestic manufacturing and supply chain for large turbines and structures.
  - The government recently approved a **VGF scheme of ₹7,453 crore for India's first 1 GW of offshore wind projects,** targeting a potential of **30 GW by 2030**.

What are the Major Challenges Hindering India's Renewable Energy Transition?

- **Grid Instability and Curtailment due to Low Storage Capacity:** The core challenge is the **intermittency** of solar and wind power, which is severely restricted by the lack of sufficient **grid-scale energy storage** and the **inflexibility of traditional coal power** plants.

- This mismatch between **daytime supply and evening demand** forces operators to *curtail* or waste clean energy, undermining the economic viability of new projects and necessitating fossil fuel use during peak hours.
- Recent data shows **solar power curtailment rates in some regions rose to as high as 12% in late 2025**, and on certain days, up to **40%** of solar output was denied access to the grid due to oversupply, proving that capacity addition is outpacing grid readiness.

- **Pervasive Counterparty Risk and Financial Distress of DISCOMs:** The financial health of state-owned **Distribution Companies (DISCOMs)** poses the single largest **credit risk** to renewable power developers, stemming from delayed payments for procured electricity.
  - These poor financials are rooted in high **Transmission & Distribution (T&D) losses**, poor billing/collection efficiency, and unrecovered costs due to subsidized tariffs, driving up the overall **Cost of Debt** for clean energy projects.
  - **Also, Many distribution companies** require **8 to 17 months** of payment support to achieve a viable credit rating.
- **Deep Reliance on Imported Components and Raw Materials:** Despite ambitious 'Make in India' and PLI schemes, the renewable energy supply chain, especially for solar and battery storage, remains heavily dependent on imports for **crucial upstream components** and **critical minerals**.
  - This import dependency exposes the sector to **geopolitical risks**, **currency fluctuation**, and global supply chain disruptions, threatening the long-term goal of **energy sovereignty**.
  - According to CEEW, India continues to rely heavily on imports of solar modules and lithium-ion batteries, with **China accounting for nearly 80% of its battery imports in 2023.**
- **Need for Massive and Affordable Climate Finance Mobilization:** The transition requires colossal cumulative investment, and the domestic financial ecosystem, despite positive steps like **Green Bonds,** still lacks the **depth and long-term, low-cost capital** needed for **capital-intensive, high-risk**, **emerging technologies like Green Hydrogen and Offshore Wind.**
  - Without innovative **blended finance** and risk-sharing mechanisms, the cost of capital will remain high, making the transition significantly more expensive than planned.
  - To achieve its **Net-Zero 2070 target,** India is estimated to require **$10 trillion** in cumulative investments, yet it faces a huge long-term **financing gap of approximately $3.5 trillion** that must be bridged by external and innovative capital.
- **Regulatory and Contractual Inconsistencies Across States:** The renewable energy framework is often hampered by **inconsistent policy implementation** and retroactive changes at the state level, creating significant **regulatory uncertainty** for investors and developers.
  - Ambiguities in areas like **curtailment compensation**, **land acquisition rules**, and **Green Open Access** implementation lead to prolonged legal disputes and deter much-needed long-term private investment.
  - Recent reports show that **Renewable Energy Implementing Agencies** have issued **Letters of Award (LoAs) for over 43 GW** of capacity where Power Sale Agreements (PSAs) **with end procurers remained unsigned,** reflecting market misalignment and uncertainty regarding project execution.
- **Land Acquisition Concern and End-of-Life Waste Management:** The transition to utility-scale renewable energy is highly land-intensive, creating unavoidable conflicts over land use—often leading to the **displacement of communities, diversion of grazing/agricultural land, and contentious land acquisition processes that raise issues of inadequate compensation, consent, and transparency.**
  - Furthermore, the future challenge of managing **e-waste from retired solar panels and batteries** is a ticking environmental time bomb

that requires the immediate scaling up of national recycling infrastructure to avoid future ecological damage.

- According to the International Renewable Energy Agency (IRENA), India currently generates around **100,000 tonnes of solar waste, but by 2030 this figure could swell to 600,000 tonnes.**

- **Critical Shortage of a Skilled Green Workforce and Training Mismatch:** Despite the promise of "green jobs," the rapid scaling of the sector is severely constrained by a significant **skills gap** and a **mismatch between academic curricula and cutting-edge industry needs**.
  - This shortfall affects everything from highly-specialized manufacturing and R&D roles to basic project installation and maintenance, leading to project delays and sub-optimal operational efficiency.
  - India is projected to face a critical shortage of **1.2 million skilled workers** in the renewable sector by **2030**, directly impacting project timelines and costs.
- **Regional Disparities and Energy Access:** Some regions will face far greater social and economic impacts during the clean-energy transition than others.
  - For example, coal-dependent states such as **Jharkhand, Chhattisgarh, and Odisha** may experience job losses and revenue decline, while renewable-rich states like **Rajasthan, Gujarat, and Tamil Nadu** stand to gain from increased investment and green jobs.
  - This uneven distribution complicates the goal of ensuring a nationally just and balanced transition.
- **Weak Data Governance and Transparency:** Inadequate, inconsistent, or delayed energy-sector data severely limits informed policy-making and undermines efficient market functioning.
  - The **absence of real-time, verified data on generation, storage, transmission capacity, and state-level transition progress reduces accountability,** weakens investor confidence, and restricts the ability to design evidence-based interventions.
  - Also, **lack of standardization and granularity provides fertile ground for "greenwashing,"** undermines the credibility of climate commitments, and increases due diligence costs for investors trying to accurately assess portfolio-wide **environmental, social, and governance (ESG) risk.**

What Steps Can India Take to Fast-Track Its Renewable Energy Transition?

- **Implement Performance-Linked Financial Discipline for DISCOMs: Financial viability of Distribution Companies (DISCOMs)** must be secured through a non-negotiable **performance-based funding model**, moving away from past bailout failures.
  - This requires a strict, enforced linkage of central government funding (like RDSS) to **tangible, measurable reductions** in Aggregate Technical & Commercial (AT&C) losses, full cost-reflective tariffs, and mandatory Direct Benefit Transfer (DBT) of subsidies.
  - The measure involves mandating **real-time digital monitoring** of loss reduction targets and strictly enforcing the **Late Payment Surcharge (LPS) Rules** to ensure timely payments to generating companies (GENCOs), thus dramatically reducing counterparty risk for private investors.
- **Establish a National Grid Flexibility Market and Storage Mandate:** Treat **grid flexibility and energy storage** as a standalone, essential service, rather than a mere ancillary component of solar and wind projects, to incentivize rapid deployment and manage intermittency.
  - This requires launching a **market mechanism** for fast-response resources and **dynamic dispatch**, fully valuing the services provided by Battery Energy Storage Systems (BESS), Pumped Storage Projects (PSP), and gas-peaker plants.

- This measure involves the **Central Electricity Regulatory Commission (CERC)** issuing a **National Energy Storage Obligation (NESO)** framework, replacing the current Renewable Purchase Obligation (RPO) system, with targets that explicitly define the **MWh** storage capacity required for **Round-the-Clock (RTC)** power.

- **Launch a Green Hydrogen Demand Creation Mandate:** To realize the ambitious Green Hydrogen Mission, the government must strategically **create anchor demand** by mandating **blending quotas** in key high-carbon industries, providing the crucial **offtake certainty** needed for massive project financing.
  - This policy signal de-risks early investments in large-scale electrolyser manufacturing and downstream infrastructure, accelerating **cost decline curves** through guaranteed economies of scale.
  - The measure involves notifying a mandatory **Green Hydrogen consumption quota** for core "hard-to-abate" sectors, starting with fertilizer production, petroleum refining, and steel, alongside **Viability Gap Funding (VGF)** schemes targeted specifically at early commercial-scale Green Ammonia export facilities.
- **Enable Virtual Net Metering and Decentralized Energy Trading:** Rooftop solar growth must transition from individual house installations to a **community-wide, virtual model** to overcome physical rooftop limitations and fully leverage the potential of distributed generation across urban areas.
  - This requires enabling regulatory frameworks for **Peer-to-Peer (P2P) energy trading** and **Virtual Net Metering (VNM)** across multiple locations owned by one entity or within cooperative societies.
  - The measure involves the **Ministry of Power (MoP) amending the Green Open Access Rules** to allow **aggregated VNM** for commercial and residential complexes, incentivizing land-constrained entities to invest in off-site or shared community solar projects, drastically increasing the urban adoption rate.
- **Create Single-Window Mega-Site Clearances for RE Zones:** Long-standing delays in **land acquisition, Right-of-Way (ROW), and inter-state transmission clearances** remain the biggest execution bottleneck, necessitating a radical simplification of the permitting process.
  - A dedicated, fast-track mechanism for nationally significant projects would cut down the time from tender award to commissioning, dramatically improving **project execution timelines**.
  - This measure involves establishing **"Renewable Energy Investment Zones (REIZ)"** with pre-cleared land banks, pre-approved environmental permits, and a **Single Project Clearance Board** comprising Central and State representatives, reducing the average project approval cycle from over 18 months to less than 6 months.
- **Upskill Human Capital through Specialized Green Technology Institutes:** Current engineering and vocational training pipeline is insufficient for the demands of highly technical, **next-generation renewable technologies** like high-efficiency *TOPCon* cells, large-scale BESS deployment, and offshore wind maintenance.
  - A coordinated national effort to create a specialized workforce is essential for sustained growth and true self-reliance **(*Atmanirbhar Bharat*).**
  - The measure involves launching a **National Green Skill Development Mission** to create **Centres of Excellence (CoEs)** in partnership with industry leaders, focusing on **Electric Vehicle (EV) charging infrastructure**, **Green Hydrogen plant operations**, and **Advanced Metering Infrastructure (AMI)** deployment and data analytics.
- **Mandate Retrofit Flexibility in Existing Coal Power Fleet:** The argument is that instead of outright immediate retirement, a cost-effective and immediate strategy for grid stability is to **mandate**

technical retrofits (e.g., boiler modifications) in the existing coal power fleet to enable **flexible operation** and two-shift cycling capability.

- This ensures that traditional plants can ramp up and down quickly to support **high variable Renewable Energy (RE) penetration**, effectively serving as a **synthetic energy storage** solution until BESS costs decline further.
- The measure involves the Central Electricity Authority (CEA) issuing new technical standards that make **flexible operation** mandatory for all thermal power plants older than 15 years, penalizing plants that fail to meet minimum **ramp rates** and offering *incentives* for fast *part-load operation*.

- **Accelerate Bioenergy Deployment Across Sectors:** Bioenergy provides both waste-management solutions and clean energy. India can scale up by:
  - **Converting agricultural residues** (e.g., crop stubble) and **municipal solid waste** into energy, reducing pollution while generating power
  - Producing **liquid biofuels** like **ethanol and biodiesel** to decarbonize road transport
  - Expanding **gaseous biofuels** such as **Compressed Biogas (CBG)** under initiatives like SATAT for use in vehicles, shipping, and aviation. This supports circular economy goals and reduces reliance on fossil fuels.
- **Deepen International Collaboration and Cross-Border Energy Cooperation:** India's leadership in global platforms must be leveraged further:
  - **International Solar Alliance (ISA)**, **Mission Innovation**, and India's climate leadership during **G20** have positioned India as both a provider and recipient of green technology and finance
  - Strengthen regional electricity trade with **ASEAN, SAARC, BIMSTEC**, and emerging green hydrogen partnerships with the **Middle East**
  - Promote joint R&D, battery storage innovation, and low-cost finance through multilateral cooperation. This accelerates technology diffusion and lowers financing costs.
- **Promote Community Participation and Gender Inclusion:** A people-centric transition ensures long-term success. This includes: Community ownership models, local co-operatives, and revenue-sharing frameworks for solar and wind projects
  - Gender-focused interventions that increase **women's workforce participation**, leadership roles, and access to green livelihood opportunities.
  - Such measures **build trust, improve adoption rates, and make energy transitions socially sustainable.**
- **Towards Just Transition:** India must ensure that coal-dependent states and vulnerable workers are not left behind. This includes: Reskilling and redeployment of coal-sector workers, diversifying state economies (e.g., Jharkhand, Chhattisgarh, Odisha)
  - Without a just transition, rapid shifts may trigger social resistance, widening regional inequalities.
  - Even well-intentioned policies—such as the **E20 fuel policy** or **Delhi's vehicle scrappage policy**—risk backlash if introduced without adequate preparedness, supply-chain readiness, or public awareness.
    - India must ensure **phased rollouts, stakeholder consultations, infrastructure readiness, and affordability safeguards** to avoid disrupting livelihoods and mobility.

Conclusion:

India's renewable energy transition stands at a decisive inflection point driven by technological advances, strong policy backing, and falling costs. Yet, **realizing its full potential demands financial innovation, institutional reforms, and grid modernization.** Accelerating this shift will not only secure energy independence but also generate green jobs and inclusive growth. Aligned with **SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), SDG 13 (Climate Action), and SDG 12 (Responsible Consumption and Production),** India's transition embodies the path toward a sustainable and resilient future.

Building A Resilient Global Nuclear Order

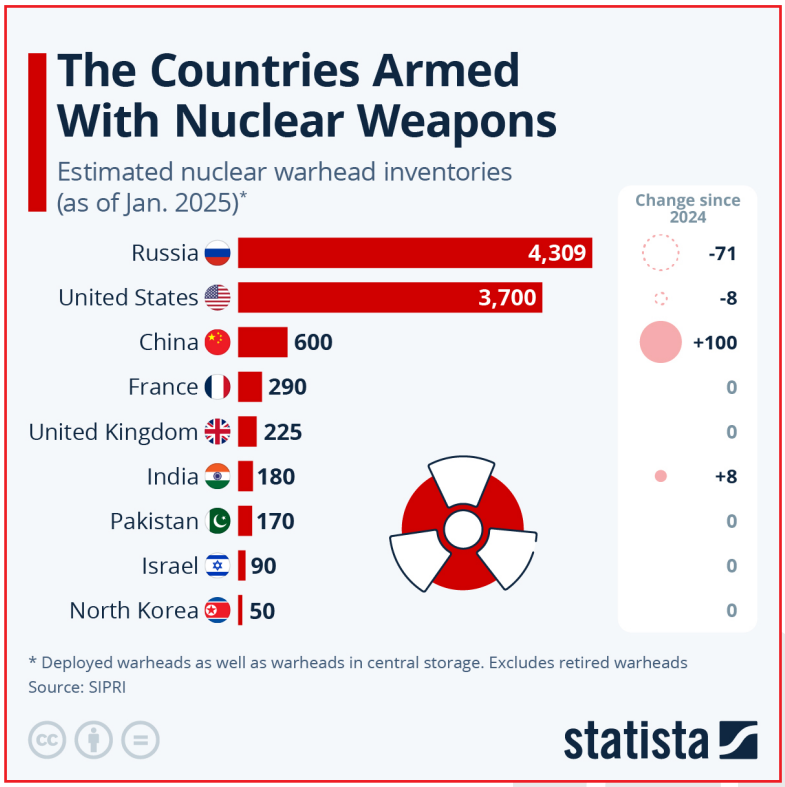
This editorial is based on "Donald Trump shakes up the global nuclear order", which was published in The Hindu on 14/11/2025. The article highlights how Donald Trump's decision to resume U.S. nuclear testing risks dismantling long-standing global arms control norms, potentially igniting new nuclear arms races among major powers and endangering the stability of the international nuclear order.

Tag: GS Paper 2, International Treaties & Agreements, Important International Institutions, Groupings & Agreements Involving India and/or Affecting India's Interests, Effect of Policies and Politics of Countries on India's Interests

Donald Trump's declaration to resume **U.S. nuclear testing** marks the most **consequential global nuclear policy shift** in decades. Against a backdrop of **weakening arms control treaties** and an **accelerating arms race** between the **U.S., Russia, and China**, the decision threatens **long-standing non-proliferation norms** and heightens **nuclear dangers**. As the world faces the risk of renewed rivalry and instability, navigating the future of the global nuclear order demands urgent, **collective rethinking** and **international diplomacy**, with **India's strategic role and responsible nuclear posture becoming increasingly significant**.

How has the Global Nuclear Landscape Evolved Over the Years?

- **Bipolar Deterrence During the Cold War:**
  - **US–USSR Bipolarity:** The nuclear order was dominated by two superpowers engaged in **Mutually Assured Destruction (MAD),** creating a fragile but stable deterrence.
  - **Arms Control Architecture:** Key treaties such as the **NPT (1968), SALT I & II, ABM Treaty (1972), and INF Treaty (1987)** institutionalised restraint and verification.
  - **Crisis Stability:** Despite flashpoints like the **Cuban Missile Crisis (1962)**, robust channels of communication and predictable behaviour ensured strategic stability.
- **Unipolarity and Partial Disarmament post-Cold War:**
  - **Breakup of the Soviet Union:** Weapons were dismantled or transferred, aided by cooperative programs.
    - The **Nunn–Lugar Cooperative Threat Reduction (CTR) Program**, initiated by the **U.S. Congress in 1991**, provided **technical and financial assistance** to dismantle nuclear, chemical, and biological weapons in former Soviet states safely.
    - In addition, the **Strategic Arms Reduction Treaty (START I and II)** facilitated the **reduction and limitation of deployed strategic nuclear warheads** between the U.S. and Russia, further contributing to global nuclear stability.
  - **US Unipolar Moment:** Russia's decline led to the U.S. shaping nuclear norms, pushing for non-proliferation and selective disarmament.
  - **New Nuclear States:** India, Pakistan, and North Korea emerged outside the NPT framework, complicating the global consensus.
- **Rise of Multipolarity and Increasing Instability in the 21st Century:**
  - **Return of Great Power Competition:** The U.S., Russia, and China are modernising their arsenals, eroding earlier arms control pacts.
  - **Erosion of Treaties:** The **ABM Treaty**, **INF**, and **Open Skies**—many pillars of Cold War stability—have been dismantled.
  - **Nuclear Testing Concerns:** Proposals to resume nuclear testing (**e.g., U.S. debate in 2025)** threaten to unravel the **CTBT norm**, raising global alarm.
    - The shift from structured bipolar deterrence to an evolving multipolar contest has made the global nuclear order more uncertain, raising the risk of miscalculation, arms races, and erosion of long-standing non-proliferation frameworks.



What are the Key Issues Shaping the Current Global Nuclear Landscape?

- **Asymmetry within the NPT (Non-Proliferation Treaty) :**
  - The NPT creates a **hierarchy of Nuclear Weapon States (NWS)** and **Non-Nuclear Weapon States (NNWS)**, leading to legitimacy concerns.
    - Discontent among NNWS persists because **Article VI disarmament commitments** by NWS remain largely unfulfilled.
  - Key states outside the NPT—**India, Pakistan, Israel, North Korea**—operate nuclear programs independently, weakening the global regime's legitimacy.
    - **North Korea's** withdrawal in 2003 demonstrated the **loophole** allowing states to exit the treaty after gaining nuclear advantage.
- **Erosion of Arms Control Architecture**
  - **Collapse of Bilateral Treaties :** U.S.–Russia arms control structures have eroded:
    - **The INF (Intermediate-Range Nuclear Forces) Treaty** collapsed in 2019.
    - Furthermore, the **New START Treaty**, which limits deployed strategic nuclear warheads and delivery systems, **faces uncertainty beyond 2026** due to **strained bilateral relations** and geopolitical tensions.
  - **Renewed Arms Race :** All nuclear-armed states are investing in **modernizing warheads, delivery systems, hypersonic weapons, MIRVs**, and **AI-enabled systems**.
    - **SIPRI (2024)** reports a **global increase** in operational nuclear warheads for the first time in decades.
    - The **U.S.**, under recent policy announcements, has signaled intent to **resume nuclear testing** for the first time since **1992**, citing advances by **Russia and China**.
- **Weak Enforcement and Verification Mechanisms:**
  - **CTBT (Comprehensive Nuclear-Test-Ban Treaty):** It has not entered into force due to non-ratification by major states like the **U.S., China, India, Pakistan**.
    - Possibility of renewed testing threatens global moratoriums.
  - **IAEA Limitations:** IAEA safeguards depend on state cooperation; **non-compliance cases** such as Iran highlight enforcement challenges.
    - "**Weaponization ambiguity**" in dual-use nuclear technology complicates monitoring.

- **Militarization of Emerging Domains:** Nuclear doctrines now intersect with **space militarization, cyber warfare, and missile defense systems**, complicating deterrence stability.
  - Concerns that **cyber intrusions** may compromise nuclear command and control systems.
- **Automation and AI Risks:** The incorporation of **automation and artificial intelligence (AI)** into early-warning systems increases the chances of **false alarms**, which could trigger unnecessary alerts.
  - It also raises the risk of **escalation** in tense situations due to rapid, automated responses.
  - Additionally, it may lead to a **loss of human control**, as decision-making becomes increasingly dependent on AI systems rather than human judgment.

Regional Nuclear Flashpoints Escalating

- **Indo–Pacific Tensions:** India–Pakistan rivalry remains fragile, with sub-conventional conflicts raising risk of miscalculation.
  - China's expanding arsenal adds a **tri-polar dynamic** in Asia.
- **Middle East Nuclear Uncertainty:** Iran's uranium enrichment levels and revival of **JCPOA (Joint Comprehensive Plan of Action)** remain uncertain.
  - Potential for a **regional proliferation cascade** involving Saudi Arabia and others.
- **Korean Peninsula Instability:** North Korea's continued missile tests defy global norms and challenge deterrence frameworks.
  - For instance, **North Korea claims it has developed AI-powered "suicide attack" drones**, raising further regional security concerns.
- **Fragmentation of Global Leadership:** Rivalries among major powers **(U.S.–China, U.S.–Russia)** reduce cooperation on nuclear-risk reduction and arms-control initiatives.

Expansion of Civil Nuclear Energy and Dual-Use Risks :

- **Spread of Nuclear Technology:** Growing demand for nuclear energy increases the dissemination of sensitive technologies such as **enrichment and reprocessing (ENR)**.
  - Raises risks of clandestine military programs under the guise of peaceful use.
- **Nuclear Security Risks:** Threats of nuclear terrorism, unsecured materials, and sabotage remain high despite efforts by the **Nuclear Security Summit process**.
  - The **2020 NPT Review Conference** did not yield substantive progress, reflecting **eroding consensus**.

What are the Key Features of India's Nuclear Doctrine?

- **No First Use (NFU) Policy:** India pledges **not to use nuclear weapons first**; they will only be used **in retaliation** to a nuclear attack on Indian territory or Indian forces.
  - **Massive Retaliation:** Any nuclear attack on India will invite a **"massive retaliation"** designed to inflict **unacceptable damage**, ensuring strong deterrence.
- **Credible Minimum Deterrence (CMD):** India maintains **only the minimum nuclear capability necessary** for deterrence, avoiding an arms race while ensuring strategic security.
- **Second-Strike Capability:** India aims to ensure survivability of its nuclear arsenal—**land, air, and sea-based platforms** (triad)—so it can retaliate even after absorbing a first strike.
- **Civilian Political Control:** Nuclear weapons remain under the **strict control of civilian leadership**, specifically the **Nuclear Command Authority (NCA)** headed by the Prime Minister.
- **Non-Use Against Non-Nuclear States:** India commits to **not using nuclear weapons against non-nuclear weapon states**, reinforcing its principled and responsible posture.

- **Rejection of Nuclear Arms Race:** India opposes any **nuclear arms build-up** and advocates for **global, verifiable, and non-discriminatory disarmament**.
- **Commitment to International Norms:** India supports **global nuclear stability** and **non-proliferation** through participation in regimes like the Missile Technology Control Regime (MTCR), Wassenaar Arrangement (WA), and Australia Group, despite not being an **NPT signatory**.

What Steps are Needed to Build a Stronger and More Stable Global Nuclear Order?

- **Revive Arms Control Agreements:**Rebuild trust through renewed U.S.–Russia negotiations to extend or replace New START (Strategic Arms Reduction Treaty), which limits deployed strategic warheads.
  - The **2021 extension of New START** shows that cooperation is still possible even amid tensions.
  - Consider a modern successor to the ***INF Treaty*** to prevent deployment of new intermediate-range missiles in Europe and Asia.
- **Strengthen the Non-Proliferation Regime:** Strengthen enforcement and verification under the ***NPT (Nuclear Non-Proliferation Treaty)*** by ensuring compliance and addressing concerns of non-NPT states.
  - Encourage more states to adopt the ***IAEA Additional Protocol*** for enhanced inspections.
    - **Iran's nuclear program** illustrates the importance of robust IAEA monitoring.
  - Enhance the **CTBT's *International Monitoring System (IMS)* to detect any covert tests.**
    - North Korea's 2017 nuclear test underscored the urgency of a universal test ban.
- **Strengthen Multilateral Diplomacy & Track-II Dialogue:** Break deadlocks in the ***UN Conference on Disarmament***, which has not negotiated a new treaty since 1996.
  - Involve think-tanks, scientists, and civil society to build trust. The **"Pugwash Conferences on Science and World Affairs"** played a key role in easing Cold War tensions.
  - Promote diplomatic frameworks in volatile regions such as **South Asia and the Korean Peninsula.**
    - Strengthen early-warning systems and cross-border communication.
    - India–Pakistan **DGMO hotline (revived in 2021)** helps manage border tensions.
  - Encourage voluntary declarations of nuclear stockpiles and doctrine clarity.
  - Cap warhead production and delivery systems through bilateral or plurilateral agreements.
    - **Example:** France and the UK regularly publish nuclear arsenal numbers, promoting transparency.
- **Regulate Emerging Strategic Technologies:** Establish norms for ***AI-enabled systems, hypersonic weapons, cyber warfare***, and ***space-based assets***.
  - **China, Russia, and the U.S.** are testing hypersonic glide vehicles, increasing first-strike fears.
  - There is a need to develop **crisis-management** protocols to prevent cyberattacks on nuclear command systems.
- **Promote Peaceful Use of Nuclear Energy:** Expand cooperation in nuclear energy under strict safeguards through ***IAEA technical assistance programs***.
  - Use nuclear technology for medicine, agriculture, and climate mitigation.
    - **India's Nuclear Energy Mission** aims to expand nuclear power capacity to **100 GW by 2047.**
  - India's use of nuclear technology in agriculture helped produce radiation-mutated high-yield crop varieties.

Conclusion

As **Reagan-Gorbachev** aptly stated, "**A nuclear war cannot be won and must never be fought.**" To safeguard **global peace**, **India** and the **international community**

must **revive arms control frameworks**, **strengthen risk reduction mechanisms**, **commit to non-proliferation and disarmament**, and **regulate emerging technologies**. **Proactive diplomacy** and **inclusive global cooperation** are essential to build a **resilient nuclear order** that guarantees **long-term security** and **stability** for all nations.

Towards A Robust Digital Data Protection Regime in India

This editorial is based on "Too little, much later: on the Digital Personal Data Protection Rules, 2025", *which was published in The Hindu on 17/11/2025.The article recognises that the Digital Personal Data Protection Rules, 2025, create a clearer, citizen-centric framework with stronger individual rights. However, it also criticises the rules for being delayed and somewhat diluted, leading to reduced transparency and deferred safeguards that weaken timely protection for citizens*

Tag: GS Paper 2, E-Governance, Transparency & Accountability, Right to Information, Government Policies & Interventions, GS Paper 3, Science & Technology, IT & Computers, Cyber Security

In an increasingly digital world, protecting **personal data** has become more critical than ever. The Government of India notified the **Digital Personal Data Protection (DPDP) Rules, 2025 in November 2025**, marking the full operationalisation of the **Digital Personal Data Protection Act, 2023**. Together, the **Act and Rules** establish a **citizen-centred framework** that balances **privacy rights** with the **lawful** and **responsible use** of digital personal data. While the framework enhances **individual rights**, strengthens **accountability**, and promotes **transparent data practices**, it has also faced criticism for **implementation delays** and **weakened transparency provisions**. These concerns pose challenges in ensuring **timely safeguards**, **effective oversight**, and **robust enforcement**.

What are the Key Features of the Digital Personal Data Protection Act, 2023?

- **Applicability:** The Act applies to the processing of **digital personal data** within India, including both data collected online and offline data that has been digitised.
  - It also covers processing outside India if it involves offering goods or services to individuals in India.
- **Core Principles:** It is based on seven key principles- **consent**, **transparency**, **purpose limitation**, **data minimisation**, **accuracy**, **storage limitation**, **security safeguards**, and **accountability**, that guide lawful data processing at every stage.
  - The Act adopts the **SARAL approach**, meaning it is designed to be Simple, Accessible, Rational, and Actionable.
- **Rights of Data Principals:** Individuals have rights to **clear consent**, **access**, **correction**, **updating**, and **erasure** of their personal data.
  - They can nominate someone else to exercise these rights on their behalf if needed.
  - The Act mandates responses to such requests within a specified timeline.
- **Obligations of Data Fiduciaries:** Entities processing data must implement reasonable **security safeguards**, obtain **explicit consent**, **erase data** when no longer needed or when consent is withdrawn, **notify** individuals and the **Data Protection Board** of breaches, and establish **grievance redressal mechanisms**.
- **Significant Data Fiduciaries:** Certain large or sensitive data handlers are designated as **significant data fiduciaries** with additional responsibilities such as appointing **data auditors**, conducting periodic **impact assessments**, and complying with stricter regulations on **new or sensitive technologies**.
  - Data fiduciaries must offer clear communication, publish contact details of **data protection officers**, conduct independent **audits**, and ensure **accountability** for the protection and lawful use of personal data
- **Data Protection Board of India:** The Act establishes an independent **regulatory authority** to monitor compliance, inquire into **breaches**, take corrective actions, impose **penalties** and handle grievances.

- **Special Protections:** The Act provides enhanced protections for **children's data** by requiring **verifiable parental consent** and restricting harmful processing like **targeted advertising** or **tracking of children**.
  - It also includes safeguards for **persons with disabilities** requiring consent from verified legal guardians.
- **Cross-Border Data Transfers:** Transfers outside India are permitted except to countries **restricted by the government**.
  - Restrictions and conditions aim to safeguard **data sovereignty** and **security**..
- **Exemptions:** Rights of the **Data Principal** and obligations of **Data Fiduciaries** (except **data security**) will not apply in specified cases, including:
  - For **notified agencies**, in the interest of **security**, **sovereignty**, **public order**, etc.
  - For **research**, **archiving**, or **statistical purposes**.
  - For **start-ups** or other **notified categories** of Data Fiduciaries.
  - To enforce **legal rights and claims**; or **prevention and investigation of offences**.
  - To perform **judicial** or **regulatory functions**.
  - To process in India **personal data of non-residents** under **foreign contract**.
- **Penalties and Enforcement:** The Act prescribes substantial **financial penalties** for breaches, including failures in **security safeguards**, **breach notification**, and **child data protection** obligations, reinforcing the seriousness of compliance.
  - The Act introduces the concept of a **Data Consent Manager** as a feature to facilitate a Data Principal's exercise of their rights.

Key Terms Under the DPDP Act, 2023

- **Data Fiduciary:** An entity that decides why and how personal data is processed, either alone or with others.
- **Data Principal:** The individual to whom the personal data relates. In the case of a child, this includes a parent or lawful guardian. For a person with a disability who cannot act independently, this includes the lawful guardian acting on their behalf.
- **Data Processor:** Any entity that processes personal data on behalf of a Data Fiduciary.
- **Consent Manager:** An entity that provides a single, transparent and interoperable platform through which a Data Principal may give, manage, review or withdraw consent.
- **Appellate Tribunal:** The **Telecom Disputes Settlement and Appellate Tribunal (TDSAT)**, which hears appeals against decisions of the Data Protection Board.

What are the Key Provisions and Intended Benefits of the Digital Personal Data Protection Rules, 2025?

- **Individual-Centred Data Governance:** The DPDP framework is designed around the needs and rights of the **Data Principal (individual)**, ensuring that citizens—not **corporations or the state—are at the heart of data protection.**
- Rules are written in **clear, simple language**, enabling ordinary users to understand their rights without legal expertise.
- Organisations handling personal data must operate with **transparency, responsibility, and demonstrable accountability**.
- **Rights of Data Principals :** Citizens can seek **information** on what personal data has been collected, why it has been collected and how it is being used.
  - Individuals can ask for a **copy** of their personal data that is held by a **Data Fiduciary**.
  - People may request **corrections** to personal data that is inaccurate or incomplete.
  - Citizens can ask for **changes** when their details have altered, such as a new address or updated contact number.
  - Individuals may request the **removal** of personal data in certain situations.
  - Every individual can **appoint someone** to exercise their data rights on their behalf.
  - Individuals now have the **explicit right to give, refuse, or withdraw consent** for the processing of their personal data.

- **Mandatory Response within Ninety Days:** Data Fiduciaries are required to **address all requests** related to access, correction, updating or erasure within a maximum of **ninety days**, ensuring timely action and accountability.
- **Protection During Personal Data Breaches:** If a **breach** takes place, citizens must be **informed** at the earliest. The message must explain what happened and what steps they can take. This helps people act quickly to reduce harm.
- **Clear Contact for Queries and Complaints:** Data Fiduciaries must provide a **point of contact** for questions relating to personal data. This may be a designated officer or a **Data Protection Officer**.
- **Special Protection for Children:** When a **child's personal data** is involved, **verifiable consent** from a parent or guardian is required.
  - This consent is needed unless the processing relates to **essential services** such as healthcare, education or real-time safety.
- **Special Protection for Persons with Disabilities:** If a person with a disability cannot make legal decisions even with support, their **lawful guardian** must give consent. This guardian must be verified under the relevant laws.
- **Harmonisation with the Right to Information (RTI) Act:** The DPDP Act amends Section 8(1)(j) of the RTI Act to harmonise **privacy rights** with the **right to information**.
  - The amendment reflects judicial reasoning that personal information should not be disclosed without assessing privacy implications.
  - It does **not limit transparency**, but ensures that disclosure is justified and responsible.
    - The **Supreme Court** in the KS Puttaswamy v. Union of India (2017) judgment affirmed **privacy as a fundamental right** under **Article 21**, underscoring the need for **legal frameworks** that uphold **individual autonomy** over **personal data**.

What are the Key Challenges Associated with India's Data Governance Framework?

- **Government Exemptions and Surveillance Risks:** The Act grants broad **exemptions to the government** for data processing in the name of **sovereignty** and **public order**, raising concerns about **unchecked surveillance** and potential **privacy violations**.
  - This has been a major criticism, fearing erosion of the **KS Puttaswamy ruling** on fundamental privacy rights.
  - The amendment to **Section 8(1)(j)** of the **RTI Act** through **Section 44(3)** of the **DPDP Act 2023** poses a serious threat to the RTI Act's core goals of **transparency** and **accountability**.
  - By creating a **blanket prohibition** on disclosing **personal information** and without clearly defining what personal information means, the amendment weakens one of India's strongest tools for **public scrutiny**.
    - It risks making the **RTI framework** less effective in ensuring **government accountability** and in preventing **corruption**.
- **Lack of Independent Regulatory Authority:** The government-appointed **Data Protection Board** lacks full **autonomy**, raising concerns about **impartiality**, **transparency**, and **selective enforcement**, which could undermine **public trust** in data regulation.
  - Because **appointments** and **administrative control** largely rest with the **executive**, the **Board** may not enjoy the **institutional independence** necessary for **impartial oversight**.
- **Challenges in Managing Consent and Data Subject Rights:** Implementing granular, **verifiable**, and **age-appropriate consent** mechanisms is complex, especially for **parental consent** in children's data processing.
  - The absence of clarity on **consent verification** adds to compliance challenges for handlers of personal data.

- The Justice B.N. Srikrishna Committee emphasised **meaningful and informed consent** as central to **data protection**, recommending that **consent** be the lawful basis for **personal data processing.**

- **Technological Gaps and New Tech Challenges:** The Act does not specifically address emerging technologies like **blockchain**, **AI**, **big data analytics**, and **IoT**, which involve decentralised, automated data processing, potentially leaving **regulatory gaps** and **legal uncertainties**.
  - Large Language Models (**LLMs**) are trained on **massive**, often **scraped datasets** that may contain **private information**.
  - This can lead to **data regurgitation**, where the **model** unintentionally leaks **sensitive personal data** from its **training corpus** to a **user** during a regular **conversation**.
  - AI **models**, particularly those using **Big Data**, can infer **sensitive personal data** (like **health conditions**, **political views**, or **sexual orientation**) from **non-sensitive**, seemingly **anonymous input**, effectively **de-anonymizing individuals** and posing **data privacy concerns**.
- **Low Public Awareness and Digital Literacy:** Many Indian users, especially in rural areas, lack awareness of their **data rights** and **how to exercise them, hindering effective use of the protections under the Act.**
  - Government campaigns are planned but lack a clear **strategy** or **scale** for widespread impact yet.
- **Cross-border Data Transfer Uncertainties:** Ambiguities around **data localisation** and **international data flows** create compliance uncertainties for multinational companies and may conflict with global regulations like **GDPR**, complicating global operations.
- **Potential Over-penalisation:** While significant **fines** are critical for enforcement, disproportionate **penalties** could stifle smaller businesses' capabilities to comply, potentially leading to **selective enforcement** or **legal challenges**.
  - Small enterprises face difficulties in meeting technical and legal requirements, like hiring **Data Protection Officers**, conducting **audits**, and maintaining **secure infrastructure**.
  - This compliance burden could discourage **innovation** or push smaller firms out due to costs and lack of expertise.

What Measures can be Adopted to Build a Robust and People-centric Digital Personal Data Protection Regime in India?

- **Strengthen Institutional Independence:** India must enhance the autonomy and independence of the **Data Protection Board of India (DPBI)** by insulating it from **governmental and corporate influence**, ensuring **impartial regulatory oversight**.
  - Drawing from **Justice B.N. Srikrishna Committee** recommendations and global models like the **European Data Protection Board (EDPB)**, a **separate budget**, **transparent appointment procedures**, and **judicial review powers** should be instituted to build **credibility** and **public trust**.
- **Clarify and Limit Government Exemptions:** The government's data processing **exemptions** on grounds of **sovereignty** and **security** should be clearly defined with **judicial or parliamentary oversight** to prevent misuse.
  - The legislative framework must embed safeguards akin to the **KS Puttaswamy v. Union of India (2017)** ruling, which affirms **privacy** as constitutionally protected, ensuring that **state interests** do not unreasonably infringe on **fundamental rights** or enable **unchecked surveillance**.
- **Enable Practical Compliance for MSMEs and Startups:** Considering cost and capacity constraints, the government should introduce **tiered compliance requirements** calibrated by **enterprise size** and **risk profile**.
  - Providing **subsidies**, **technical assistance**, **capacity-building programs**, and **shared infrastructure platforms** (e.g., centralized **Consent Managers**) can ease the burden on

SMEs, encouraging **innovation** while maintaining robust **privacy safeguards**.
- This approach aligns with international best practices observed in jurisdictions like **Singapore** and **Australia**.

- **Mandate Clear and Verifiable Consent Mechanisms:** The government must enforce standards for **granular**, **easily comprehensible**, and **verifiable consent** processes, including **age-appropriate parental verification** for children's data, to uphold **agency** and **transparency**.
  - Learning from **GDPR's explicit consent requirements**, technological **interoperability standards** for Consent Managers should be set and regularly **audited** to prevent **consent fatigue** and ensure genuine **user control**.
- **Enhance Public Awareness and Digital Literacy Initiatives:** To maximize the framework's effectiveness, the government should launch **large-scale education campaigns** targeting urban and rural populations alike, raising awareness of **data privacy rights** and **remedies**.
  - Partnering with **civil society**, **educational institutions**, and **digital platforms** for accessible content in multiple languages will empower citizens to holistically exercise their protections and hold entities **accountable**.
- **Address Emerging Technology Challenges:** A dedicated **task force** should be formed to study and design regulatory guidance for evolving technologies like **AI**, **blockchain**, **IoT**, and **big data analytics**, ensuring they comply with **data protection principles** without stifling **innovation**.
  - **Dynamic rules** and **periodic reviews** could maintain **regulatory relevance** and anticipate risks, as recommended by the **Srikrishna Committee** and reflected in frameworks like the **EU's AI Act.**
- **Streamline Cross-border Data Transfer Regulations:** The government should clarify **data localization norms** while promoting safe, standardized **bilateral and multilateral data transfer agreements** to facilitate **global trade**.
  - Aligning with international frameworks (e.g., **GDPR's adequacy decisions**) will enable Indian businesses to compete internationally while safeguarding **data sovereignty** and **citizens' rights**.

Conclusion:

India's **Digital Personal Data Protection Act, 2023**, along with the **Rules, 2025**, represents a major milestone in operationalising the constitutional right to **privacy** affirmed in the **K.S. Puttaswamy judgment**. Yet, its success hinges on overcoming critical **implementation challenges**. Strengthening **independent oversight**, refining **exemptions**, simplifying **SME compliance**, improving **consent frameworks**, enhancing **digital literacy**, regulating **emerging technologies**, and ensuring smooth **cross-border data transfers** are essential to create a balanced **data-governance ecosystem** that safeguards rights while enabling **innovation** and **economic growth**.

Reinvigorating India–Africa Partnership

This editorial is based on "India needs to 'connect, build and revive' with Africa", which was published in The Hindu on 18/11/2025. The article discusses the need for India to deepen and revitalise its strategic, economic, and cultural partnership with Africa by focusing on mutual development, enhanced cooperation, and stronger institutional ties.

Tag: GS Paper 2, India and its Neighbourhood, Groupings & Agreements Involving India and/or Affecting India's Interests, Effect of Policies and Politics of Countries on India's Interests

Ten years ago, New Delhi hosted the last **India-Africa Forum Summit (IAFS-III)**, a **landmark event** gathering representatives from **all 54 African states**. This summit marked a **high point** in India's **diplomatic outreach** to Africa, based on **shared histories** and **aspirations**. However, since then, **engagement momentum has waned** amid mounting **geopolitical competition**, **infrastructure challenges**, and Africa's **evolving needs**. **Revitalising this partnership** is critical to addressing mutual challenges in **trade**, **capacity building**, **governance**, and **sustainable development**.

What are the Key Factors Driving the Evolving Partnership Between India and Africa?

- **Economic Complementarity and Expanding Trade:** India and Africa share remarkable economic complementarity.
  - **Africa provides critical raw materials, while India offers manufactured goods**, pharmaceuticals, engineering products and digital technology.
  - Bilateral trade has grown from **USD 56 billion in 2019–20 to over USD 100 billion in 2024–25**, reflecting strong economic momentum.
    - India aims to double exports to **USD 200 billion by 2030**, leveraging Africa's growing demand for affordable goods, telecom solutions and healthcare products.
  - Major trading partners include **Nigeria, South Africa and Tanzania**, offering opportunities for deeper integration through value chains.
- **Industrial and Infrastructure Development:** India's growing investments in Africa's industrialisation demonstrate a long-term commitment to shared prosperity.
  - Indian firms have established manufacturing units—particularly in **pharmaceuticals and IT**—in **Kenya, Nigeria and South Africa**, creating employment and supporting regional value chains.
  - India also contributes to Africa's infrastructure development through logistics partnerships, transport corridors aligned with **PM Gati Shakti**, and smart-city collaborations.
  - Indian digital and telecom companies—such as **Reliance Jio and Bharti Airtel**—are rapidly scaling operations in Africa, tapping into its fast-growing digital economy.
    - Countries like **Namibia** and **Ghana** are partnering with India to adopt **UPI-style payment systems**.
    - **Togo** is using India's **Modular Open-Source Identity Platform (MOSIP)** for its **national digital ID**.
  - With a projected **4% GDP growth in 2025**, Africa represents a major expansion frontier for Indian businesses.
- **Strategic and Security Cooperation:** India's strategic presence in Africa is expanding through defence diplomacy, counterterrorism training and maritime cooperation.
  - With shared concerns over piracy, extremism and instability in the **Indian Ocean Region**, India partners with African navies on joint exercises, hydrography, surveillance and capacity building.
  - India's strategic presence in Africa is growing through initiatives like the **Africa India Key Maritime Engagement (AIKEYME) 2025**, jointly conducted with **nine African navies** to improve **anti-piracy** and **humanitarian operations**.
  - The Indian Navy's deployment of **INS Sunayna** for **surveillance** and **joint maritime exercises** with **Tanzania** and **Kenya** further enhanced **regional security**.
  - These efforts secure **sea lanes** vital for India's **energy imports** and **counterbalance geopolitical rivals** in the **Indian Ocean region**.
- **People-to-People Bonds and Development Cooperation and Human Capacity Building:** The **3 million-strong African–Indian diaspora** and rising educational and cultural exchanges form the emotional foundation of the partnership.
  - India has extended **over USD 12 billion in concessional loans** and **USD 700 million in grants**, supporting infrastructure, agriculture, energy and education projects across the continent.
  - **Since its inception in 1964**, the **Indian Technical and Economic Cooperation (ITEC)** programme has been pivotal in enhancing the **skills of African professionals**.
    - With an increase in **training slots** from **2,476 in 2015** to **3,851 in 2024**, the programme has **trained over 26,000 Africans** in various **civilian and technical domains** (ITEC, 2025).

- **Shared Global South Identity and Multilateral Advocacy:** India and Africa often collaborate in global forums to champion the interests of developing nations.
  - Both seek reforms in the UN Security Council, WTO, and climate finance frameworks, advocating for fairness, technology transfer and sustainable development.
  - **African Union's inclusion in the G20 during India's Presidency** reflects India's commitment to promoting a more representative global governance structure.

What are the Major Challenges Hindering the Growth of the India-Africa Partnership?

- **Strategic Inertia and Diplomatic Engagement Gaps:** A significant hurdle is India's delayed political engagement with Africa.
  - The prolonged **gap** of nearly a decade since the last **India-Africa Forum Summit** demonstrates a lack of continuous **strategic dialogue**, which weakens India's **leadership position** on the continent.
  - This **strategic inertia** reduces India's ability to adapt to Africa's rapidly evolving priorities and curtails the momentum of current cooperation efforts.
- **Complex Security Landscape and Fragile Governance:** Africa's security environment is unstable, marked by **multiple military coups** and ongoing **armed conflicts** in countries like **Ethiopia, Sudan, and the Central African Republic**.
  - Weak **governance**, **insurgency**, and rising **radicalization** hamper India's ability to effectively engage in **defense cooperation**, **peacekeeping**, and **counterterrorism** efforts.
  - The security challenges create an environment unfavorable for long-term investments and strategic partnerships.
- **Structural Economic and Infrastructure Bottlenecks:** Africa's **infrastructure** remains a barrier to deepening trade and investment.
  - The fragmented **transport and logistics systems**, a **colonial legacy** designed primarily for **resource export**, raise **transaction costs** and hinder **intra-African trade** crucial for building **regional value chains**.
  - India-funded **infrastructure projects** in Africa frequently experience **procedural bottlenecks**, **funding disbursement delays**, and **logistics difficulties**, especially in **remote or conflict-prone regions**.
  - Africa's **healthcare systems** face severe **resource limitations** and **fragmented regulatory regimes**, creating challenges in **medical cooperation**.
    - Though India has supplied **vaccines** and **essential medicines** to **32 African countries**, expanding **local production** and **equitable distribution** is impeded by complex **logistics** and **policy hurdles**.
- **Financial Constraints and Global Systemic Biases:** African economies face a worsening **debt crisis**, with **debt-to-GDP ratios doubling from 30% to 60%** in under a decade.
  - This **financial fragility**, compounded by **systemic biases** in global financial institutions, restricts African countries' **fiscal space** for development projects.
  - While India has extended over **$12 billion** in **concessional credit lines**, these are insufficient to address Africa's massive **infrastructure and**

development financing needs, limiting strategic cooperation.

- **Intense Multipolar Geopolitical Competition:** India competes for influence with dominant players such as **China**, which has invested heavily through the Belt and Road Initiative and established its first overseas **military base in Djibouti**, alongside extensive **aid and infrastructure projects**.
  - **China** follows a **state-backed**, **State-Owned Enterprise (SOE)**–led model that enables the rapid rollout of **high-visibility mega-projects**—such as **ports**, **railways**, and **large power plants**. This approach delivers **scale**, **speed**, and **visible impact**, often outpacing India's more **decentralized** and commercially structured **Line of Credit (LoC)** model, which tends to be **slower in execution.**
  - **Western countries** maintain strong historical **aid** and **security ties**. India's more cautious diplomacy and slower **trade footprint** risk **marginalisation** in vital geopolitical and economic sectors.

What Major Initiatives has India Implemented to Support the Aspirations and Strategic Concerns of the Global South?

- **Voice of the Global South Summit:** India launched this summit in 2023 to provide a common platform for **developing countries**, **shared challenges**, **collective voice**, and **global forums**.
- **India-UN Global Capacity Building Initiative:** A collaborative program with the UN aimed at supporting **Sustainable Development Goals (SDGs)** in Global South countries through **digital health**, **vocational training**, and **food security** programs.
- **Indian Technical and Economic Cooperation (ITEC) Programme:** A long-standing initiative providing **technical assistance** and **capacity-building training** in sectors like **health**, **agriculture**, and **IT** to over **160 developing countries**, enhancing **human resource development**.
- **Global Development Compact Proposal:** Proposed by PM Modi, this framework focuses on **trade for development**, **capacity building**, **technology sharing**, and **concessional finance** to support **sustainable growth** across the Global South.
- **International Solar Alliance (ISA):** Launched by India and France, ISA promotes **solar energy adoption**, **affordable renewable energy**, and **climate change** mitigation with over **121 member countries**, mainly from the Global South.
- **Multilateral Forum Engagement:** India actively participates in **BRICS**, **G20**, and other platforms advocating **Global South reforms**, including **African Union's inclusion**, and calls for **UN Security Council** and **World Bank reforms**.
- **Asia-Africa Growth Corridor (AAGC):** A collaborative initiative with Japan enhancing **connectivity**, **trade**, and **infrastructure development** between Asia and Africa to foster **sustainable** and **inclusive economic growth**.
- **South-South and Triangular Cooperation:** India promotes partnerships where developing countries share **context-specific solutions**, supported by **triangular cooperation** in sectors like **agriculture** and **health** across Africa and Latin America.
- **Global South Development Fund Advocacy:** India champions creating **multilateral funds** for **infrastructure**, **digital transformation**, and **climate resilience** projects to support Global South development.
- **Structured Regional Engagements:** Platforms like the **India-Africa Forum Summit**, **FIPIC**, and India-CARICOM Summits enable structured dialogue, **development cooperation**, and **investment partnerships** with Global South regions.

What Key Measures can India Take to Deepen and Strengthen Its Bilateral Engagement with Africa?

- **Institutionalize a Robust Multi-Stakeholder Strategic Dialogue:** India should establish an annual **India-Africa Strategic Partnership Forum** involving governments, private sector players, academia, and civil society stakeholders to facilitate continuous, adaptive **policy dialogues** and **joint agenda setting**.
  - This forum would ensure **real-time coordination** and responsive engagement on critical issues like **food security**, **climate resilience**, and **digital transformation**.
  - It would build on lessons from past **India-Africa Forum Summits (IAFS)** by emphasizing **measurable outcomes**, **accountability**, and a dedicated **monitoring mechanism**.
- **Design Sector-Specific Roadmaps Aligned with African Priorities:** India must co-develop detailed **sectoral** and **country-specific roadmaps** in consultation with African governments and **Regional Economic Communities (RECs)**.
  - These roadmaps should focus on **infrastructure**, **agriculture**, **technology transfer**, **renewable energy**, and **capacity building**, ensuring alignment with **Africa's Agenda 2063**.
  - Operationalizing the **IAFS-III framework** with clear timelines will enhance **clarity**, **trust**, and **implementation efficiency**.
- **Expand Financial Cooperation through Innovative Mechanisms:** Recognising Africa's growing **debt vulnerability**, India should augment **concessional credit lines**, develop **blended finance tools**, and participate in **multilateral debt relief** efforts.
  - India can explore **development impact bonds** and **green financing** partnerships to catalyze investments in **climate-resilient infrastructure** and **social sectors**, supporting Africa's development while ensuring **fiscal sustainability**.
- **Scale Capacity Building and Skill Development Programs:** India should expand **ITEC programs**, **scholarships**, and **vocational training centers** across African nations.

- Establishing **regional centers of excellence** in **AI**, **biotechnology**, and **renewable energy** will strengthen **human capital development**, **youth employment**, and **innovation ecosystems** aligned with Africa's long-term needs.

- **Modernize Trade and Payment Mechanisms:** To significantly boost **bilateral trade** and reduce **transaction costs**, India must move beyond traditional **dollar-based settlements** and simplify **trade logistics**.
  - India should actively promote and expand the use of the **Special Rupee Vostro Account (SRVA) mechanism** with key **African trading partners** (like **Nigeria**, **South Africa**, **Kenya**) to facilitate **bilateral trade settlements** in **Indian Rupees** and **local African currencies**.
  - This measure reduces **currency risk** and dependence on the **US dollar**, making **trade faster and cheaper** for businesses in both regions, thereby creating a stronger **economic anchor** for the partnership.
- **Deepen Digital Public Infrastructure Cooperation:** India must leverage its expertise in **digital public goods** such as **UPI**, **digital identity systems**, and **e-governance** to support Africa's **digital transformation**.
  - Collaboration on **digital health**, **financial inclusion**, and **e-education** will reduce **technology gaps** and accelerate **inclusive growth** across the continent.
- **Strengthen People-to-People and Cultural Ties:** Enhancing **educational exchanges**, **cultural diplomacy**, and **diaspora engagement** will create strong **social capital**.
  - Expanding **Indian cultural centers**, offering more **scholarships**, and promoting **cultural festivals** can deepen **long-term goodwill** and cooperation beyond formal diplomacy.
- **Enhance Maritime Security and Defense Partnerships:** India should intensify cooperation on **maritime domain awareness**, **joint military exercises**, and **anti-piracy operations** to ensure stability in the **Indian Ocean region**.
  - Developing **military training hubs** and **defense production collaborations** will support Africa's **regional security** goals while advancing India's **strategic interests**.

Conclusion:

India-Africa relations epitomise a historic partnership built on **shared values** and **mutual aspirations**. As **Dr. Shashi Tharoor** eloquently stated at the UN, **"India and Africa have traversed similar paths, sharing values and dreams of freedom and development."** To realise this vision, India must **institutionalise strategic dialogues**, **align investments with African priorities**, **enhance capacity building**, and foster enduring **cultural** and **digital ties**. Such a **multidimensional approach** will ensure a **resilient**, **equitable partnership** that advances **sustainable development** and **global solidarity**.

India'S Deepening Groundwater Crisis

This editorial is based on "Hidden cost of polluted groundwater" which was published in The Hindu on 20/11/2025. The article brings into picture the hidden groundwater crisis in India, where one-fifth of tested samples across 440 districts are contaminated. With 600 million people dependent on groundwater, this rising pollution and over-extraction threaten irreversible health and agricultural losses.

Tag: GS Paper - 3, Conservation, Environmental Pollution & Degradation, Irrigation

India faces a silent crisis beneath its surface: **groundwater contamination affecting nearly one-fifth of tested samples across 440 districts, with uranium, fluoride, nitrate, and arsenic exceeding safe limits.** This invisible threat costs the nation nearly **$80 billion annually-around 6% of GDP**-through health expenses, lost productivity, and agricultural decline. With **600 million Indians dependent on groundwater for drinking and irrigation**, the crisis disproportionately impacts the poor who cannot afford alternatives. Reckless over-extraction, already exceeding sustainable limits by 1.5 times in states like Punjab, compounds the problem by forcing deeper

drilling that worsens water quality. Unlike scarcity, **contamination is often irreversible, making immediate action not just urgent but essential to prevent a national catastrophe.**

What is the Current Status of India's Groundwater Usage?

- **Overall Water Budget and Extraction Rate:** The nation's **Total** Annual Groundwater Recharge is assessed at **446.90 Billion Cubic Meters (BCM)**, demonstrating a consistent upward trend since 2017 due to significant government and community-led conservation efforts like the creation of water conservation structures.
  - The **Annual Groundwater Extraction** stands at **245.64 BCM (Dynamic Ground Water Resources assessment 2024)**. This gives a national average **Stage of Extraction** of approximately **60.47%**, which suggests that at the aggregate level**, extraction remains within the annual replenishment capacity.**
    - However, this national average masks severe localized crises.
- **Sectoral Dominance and Geographical Hotspots:** The agricultural sector remains the dominant consumer, accounting for approximately **87%** of the total annual groundwater draft, which makes it the single largest driver of the crisis.
  - Groundwater hotspots are critically concentrated in the **Northwestern regions**, including **Punjab, Haryana, Delhi, and Rajasthan,** where extraction in many blocks routinely exceeds 100% of the annual replenishable resource, fueled largely by the cultivation of water-intensive crops under subsidized power.
  - Urban centers are seeing rapid, localized depletion due to unchecked commercial and domestic extraction, leading to issues like **land subsidence** in megacities.

What are the Key Factors Exacerbating Groundwater Depletion in India?

- **Subsidized Agricultural Electricity:** Subsidized or free electricity for agricultural pumping removes the **financial disincentive for excessive water use,** leading to unregulated extraction and high pump-hour intensity. This policy distortion encourages farmers to pump groundwater without limit, even for low-value crops.
  - Studies indicate that the **price elasticity of groundwater extraction is around –0.18, meaning subsidies significantly increase pumping**.
  - This means that a 10% increase in the cost of electricity would reduce groundwater extraction by about 1.8%, while heavy subsidies have the opposite effect, fueling unchecked pumping.
  - The 'Groundwater: A Valuable but Diminishing Resource' report by the standing committee on water resources under the Jal Shakti ministry observed that subsidised electricity provided by state governments had led to over-extraction of groundwater as farmers used it extensively to run pumps that draw up groundwater.
- **High Minimum Support Price (MSP) for Water-Intensive Crops:** Government procurement policies, particularly the MSP for paddy and sugarcane**,** incentivize farmers to cultivate water-guzzling crops even in arid zones.
  - This policy acts as a **perverse incentive**, effectively subsidizing water depletion by making the cultivation of unsustainable crops financially viable, thus creating **an agricultural water demand that far exceeds the natural recharge capacity of these regions.**
  - MSP-driven paddy cultivation in Punjab and Haryana consumes an estimated **4,000–5,000 litres of water per kilogram of rice.**
  - The **recent** Dynamic Groundwater Resource Assessment Report **found 736 overexploited assessment units**, heavily concentrated in the Indo-Gangetic basin.
- **Rapid Urbanization and Industrial Demand:** Unplanned urban expansion seals natural recharge areas with roads and buildings**, reducing rainwater infiltration into aquifers.**

- The **creation of "concrete jungles"** prevents surface water from naturally recharging the aquifers, disrupting the hydrologic cycle essential for sustainability.
  - Furthermore, the **concentrated, high-volume pumping required to meet the demands of growing urban populations and industrial hubs** creates unsustainable cones of depression, especially in peri-urban areas.
- A recent study, **"Building Damage Risk in Sinking Indian Megacities,"** reports that around 878 km^2 of land across five major Indian cities, **Delhi, Chennai, Mumbai, Kolkata, and Bengaluru,** is experiencing subsidence.

- **Fragmented and Weak Regulatory Framework:** The root of the crisis lies in the **Indian Easements Act, 1882**, which ties groundwater rights directly to land ownership.
  - This archaic law grants landowners the absolute right to extract water beneath their property, treating it as a private asset rather than a shared "Common Pool Resource."
  - Despite CGWA guidelines, enforcement is weak and often limited only t**o officially notified "over-exploited" areas.**
  - Only about 14% of the overexploited blocks in the country are currently notified. The **NAQUIM project,** despite mapping progress, struggles to translate aquifer-level assessments into enforceable local groundwater management plans.
- **Climate Change and Erratic Monsoon Patterns:** Climate change has increased **rainfall variability, with intense but short-duration events** that reduce infiltration and increase runoff, lowering aquifer recharge.
  - The Southwest Monsoon, which accounts for about 60% of India's groundwater recharge, recorded a **5.6% rainfall deficit in 2023.**
  - India's groundwater depletion rate could **triple by 2080** due to farmers' adaptation to warming climate, threatening food & water security.
- **Lack of Granular, Real-Time Monitoring and Data Access:** The sheer scale of groundwater extraction is not adequately captured by the current monitoring network, which relies on a mix of observation wells, many of which are non-real-time.
  - This **lack of granular, easily accessible, and high-frequency data prevents timely and evidence-based local interventions** in critically stressed areas.
    - Most groundwater extraction occurs through private tube wells that remain unmonitored.
  - Crucially, the **6th Minor Irrigation Census (2023)** reported over **21.93 million groundwater structures** (dug wells, tube wells), with **98.3%** of these schemes under **private ownership** and **therefore unmonitored for extraction volume.**

What are the Key Indian Government Initiatives Related to Groundwater Management?

- **Atal Bhujal Yojana:** This is a Central Sector Scheme launched in 2019 (extended till March 2026) with World Bank funding, targeting improved **Groundwater Management** in **8,203 water-stressed Gram Panchayats** across seven states.
- **Jal Shakti Abhiyan (JSA)- Catch the Rain (CTR):** Launched in 2019 and continued annually, this is a **time-bound, mission-mode campaign** with the slogan **"Catch the Rain, Where it Falls, When it Falls"**.
  - It aims for convergence of schemes to create a mass movement (*Jan Andolan*) for water conservation.
- **National Aquifer Mapping and Management Program (NAQUIM):** Implemented by the **Central Ground Water Board (CGWB),** the primary goal is the **scientific delineation and mapping of aquifers** at a micro-level across the country.
- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY):** While an irrigation scheme, it plays a direct role in groundwater demand management with the motto **"More Crop Per Drop"**.

- **AMRUT 2.0 (Atal Mission for Rejuvenation and Urban Transformation):** A mission launched in 2021 to make cities "water-secure" and "self-reliant" through universal water supply and better sewage management.

What Steps can India take to Ensure Sustainable and Effective Groundwater Management?

- **Decoupling MSP and Electricity Subsidies from Water Use:** Implement a direct benefit transfer (DBT) scheme for power subsidies, credited directly to farmer bank accounts, and simultaneously mandate the installation of smart meters or limit free supply hours to achieve **quantifiable power rationing**.
  - Complement this with a revised MSP structure that **incentivizes crop diversification** towards millets, pulses, and oilseeds in water-stressed regions, making unsustainable crops financially unattractive.
  - This structural change shifts the focus from water-intensive farm output to **economic water efficiency**.
  - Explore shifting support from price-based subsidies (MSP) to income-based support (PM-KISAN variants) conditioned on adopting water-saving practices.
- **Institutionalizing Aquifer-Based Governance:** Formally **sever the legal link between land ownership and groundwater rights**, positioning the state as the public trustee of this shared resource, with management authority devolved to **Panchayat/Gram Sabha-level Water User Associations (WUAs)**.
  - These WUAs, guided by the **National Aquifer Mapping (NAQUIM)** data, should be legally empowered to create and enforce **Aquifer Management Plans** and locally relevant rules for well spacing and volumetric extraction limits.
  - This ensures management is hydro-geologically sound and socially legitimate.
- **Deployment of Real-Time IoT Monitoring and AI Analytics:** Establish a high-density network of **Internet of Things (IoT)-enabled piezometers and digital flow meters** across all notified blocks, transmitting real-time groundwater level and extraction data to a unified **'Bhu-Neer' Digital Platform that was launched in 2024**.
  - Employ **Artificial Intelligence (AI)** and **Machine Learning (ML)** models to forecast aquifer stress, detect illegal extraction patterns, and generate automated, **hyper-local advisory bulletins** for farmers, transitioning the monitoring system from reactive assessment to **predictive, data-driven governance**.
- **Mandating Integrated Urban Water Management (IUWM):** Enforce strict compliance with **Model Building Bye-Laws (MBBL)** to mandate decentralized Rainwater Harvesting (RWH) and **Artificial Recharge Structures (ARS)** for every new urban development, and require the **rejuvenation of traditional urban water bodies** (tanks, lakes).
  - Crucially, India needs to pass legislation to make the use of **treated wastewater compulsory for all non-potable purposes in the industrial, construction, and public amenity sectors,** promoting a **circular water economy** in cities.
  - Deployment of Community Water Purification Plants (CWPPs) in arsenic/fluoride affected belts and blending surface water with groundwater to dilute toxicity (conjunctive use).
- **Financializing Groundwater Recharge as a Public Good:** Introduce a **Groundwater Security Levy** or fee on industrial and commercial high-volume extractors, with the revenue directly hypothecated to an **Aquifer Recharge Fund** managed at the district level.
  - This fund should provide **performance-linked incentives** to Gram Panchayats and farmers for constructing and maintaining effective **Water Conservation Structures (WCS)** and for adopting **drought-resistant cropping systems**, creating a sustainable local financing loop.

- **Promoting Pressurized Micro-Irrigation and Precision Farming:** Launch an intensified, mission-mode scheme to achieve **100% adoption of drip and sprinkler irrigation** in all over-exploited and critical blocks within a defined timeframe, potentially linking it to the continuation of agricultural power benefits.
  - This must be complemented by **precision agriculture techniques** like soil moisture sensors and remote sensing for **contextual water scheduling**, maximizing **crop-per-drop** productivity and drastically reducing withdrawal volumes.
- **Capacity Building for Hydrogeological Literacy:** Invest significantly in the **upskilling and training** of Gram Panchayat officials, local engineers, and farmers in the principles of **participatory hydrogeology** and **Water Budgeting**, using the granular data from NAQUIM and IoT networks.
  - Develop simplified, vernacular-based **Aquifer Information Systems** that clearly communicate recharge/draft status, enabling local stakeholders to make informed, resource-based decisions and foster a collective **stewardship ethic over their shared water resource.**

Conclusion:

India's groundwater crisis is not just an environmental challenge but a direct threat to public health, agricultural stability, and long-term economic security, **striking at the core of SDG 6 (Clean Water and Sanitation).** Addressing it demands scientific governance, efficient water use, and community-led stewardship aligned with **SDG 12 (Responsible Consumption) and SDG 13 (Climate Action)**. By integrating technology, reforming incentives, and restoring natural recharge systems, India can reverse its alarming decline.

Reimagining Urban India for A Resilient Future

This editorial is based on "Why designing with people in mind is now essential for India's urban future" which was published in The Business Standard on 20/11/2025. The article brings into picture India's rapidly expanding urban future and argues that seizing this moment requires moving from rigid, top-down planning to flexible, human-centred, climate-resilient design. It calls for making design a core civic and governance capability aligned with real needs and lived experiences.

Tag: GS Paper - 1, Urbanization, Population and Associated Issues, Poverty and Developmental Issues, GS Paper - 2, Government Policies & Interventions, Welfare Schemes, Issues Relating to Development

India's urban trajectory presents a defining challenge: by **2036, cities are projected to house 600 million people and generate nearly 70 percent of GDP,** yet this growth continues to unfold without coherent design or systemic intentionality. Unlike older nations forced to retrofit legacy systems, India possesses a rare opportunity to shape first versions of the infrastructure it will rely on through 2050, but only if it fundamentally reimagines its approach. What is urgently needed is a shift from **rigid, top-down planning to iterative, human-centered design thinking—one that listens before deciding, aligns infrastructure with lived realities,** integrates **climate resilience, and transforms design from a specialist domain into a civic muscle** embedded in governance, budgeting, and policy-making at every level.

What are the Major Developments Driving India's Sustainable Urban Transformation?

- **Flagship Mission-Smart Cities Initiative:** The Smart Cities Mission (SCM) is pioneering a **data-driven approach,** transforming **urban governance and service delivery through integrated technology.** This holistic development creates resilient and efficient urban systems, moving beyond mere infrastructure to citizen-centric solutions.
  - As of early 2025, **all 100 Smart Cities have operational Integrated Command and Control Centres (ICCCs)**, utilizing AI and IoT for informed decisions.
  - **Smart Cities** have implemented **Area-Based Development projects,** retrofitting, redevelopment, and greenfield models, focusing on walkability, energy-efficient buildings, open spaces, and mixed-use planning.

- **Sustainable Urban Mobility Revolution:** There's a strong policy push to shift from private vehicles to **low-carbon, mass-transit solutions** to tackle severe urban congestion and air pollution.
  - This includes massive public transport expansion and a focus on electric mobility. The goal is to build safe, efficient, and inclusive transport systems.
  - The metro rail network has expanded dramatically, now covering over **1,013 km across 23 Indian cities**, up from just 248 km in 2014.
    - The **PM-eBus Sewa Scheme** further aims to deploy **10,000 e-buses** to green public transit fleets.
- **Water Security through AMRUT and Conservation:** The **Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and its successor, AMRUT 2.0**, are focusing on universal water supply and efficient sewage management to ensure long-term urban water security.
  - This infrastructure upgrade is crucial for making cities resilient against climate change-induced water stress.
  - AMRUT initiatives have already established a significant **4,429 MLD of sewage treatment capacity**.
  - City-level successes, like **Khandwa** in Madhya Pradesh, received a **₹2 crore incentive** for exceeding targets with over **1.29 lakh water conservation structures** under the **'Catch the Rain' initiative.**
- **Circular Economy and Solid Waste Management:** Focus is rapidly shifting to a **circular economy model** by promoting source segregation, material recovery, and waste-to-wealth technologies to address the colossal challenge of urban waste.
  - Stricter **Extended Producer Responsibility (EPR)** norms for e-waste and plastics are driving formal recycling channels.
  - India is promoting the establishment of **decentralized waste processing units at the ward or zone level**, moving away from reliance on massive, distant landfills.
    - This strategy **minimizes transportation costs, reduces the environmental impact of long hauls**, and encourages local community ownership in waste management
- **Green Buildings and Energy Efficiency Mandates:** Mandates for **energy-efficient construction** and the rise of the **Green Building movement** are reducing the massive environmental footprint of the burgeoning construction sector.
  - These initiatives ensure lower operational costs, better occupant health, and reduced carbon emissions across the urban built environment.
  - **Green buildings** in India can achieve energy savings of **20–30%** compared to conventional structures.
  - India holds a leadership position globally, with over **7 billion square feet of green buildings** as of 2023, driven by certifications like **LEED and the government's push for new green building policies.**
- **Digital Governance and Citizen Engagement:** The adoption of **digital platforms, geospatial technology, and e-governance solutions** is enhancing transparency, improving service delivery, and fostering crucial **citizen participation** in urban planning.
  - This shift moves away from opaque, centralized planning to a decentralized, interactive model.
  - **Geospatial technologies** and data analytics are increasingly used for asset mapping and infrastructure monitoring.
  - Key national initiatives like the **National Urban Digital Mission (NUDM)** and **Digital India** are the backbone, creating shared digital infrastructure and platform-based urban services.
    - In a participatory example, residents of Pune can now **track pothole repairs in real time** via a dedicated mobile application, demonstrating improved public accountability.

- **Affordable and Climate-Resilient Housing:** The government's focus on **"Housing for All"** through schemes like Pradhan Mantri Awas Yojana (PMAY) now integrates key sustainability and climate resilience features into affordable housing projects.
  - This addresses the dual challenge of housing shortage and vulnerability to environmental shocks.
  - As of **November, 2024**, **PMAY-U** has sanctioned **1.18 crore houses,** ensuring sustainable design features are integrated from the initial planning stages, a major step against unsafe living conditions.

What Major Challenges Confront India's Urban Development Landscape?

- **Fiscal Constraints of Urban Local Bodies (ULBs):** Urban Local Bodies (ULBs) are **financially weak,** lacking the fiscal autonomy and robust revenue streams necessary to fund essential services and large-scale infrastructure projects.
  - Their heavy dependence on state and central grants, combined with poor own-source revenue mobilization, severely limits their capacity for effective governance and service expansion.
  - Since **2002**, municipal finance **has stayed at just 1% of GDP.** Municipal bodies contribute **45% of urban investments**, while the remainder is managed by parastatal agencies.
    - Despite an **increase in central and state transfers from 37% to 44%**, the financial health of municipalities remains precarious.
    - Tax revenue grew by **only 8% between 2010 and 2018,** grants by 14%, and non-tax revenue by 10.5%.
- **Unplanned Urban Sprawl and Planning Failures:** The majority of Indian cities are characterized by **fragmented, unplanned urban sprawl**, often due to the failure to effectively enforce master plans or the complete absence of a modern planning framework.
  - This results in inefficient land use, the proliferation of unauthorized colonies, and a disproportionate burden on central city infrastructure.
  - As per NITI Aayog, almost **65% of urban settlements or census towns in India have no 'master plan',** which has led to piecemeal interventions, haphazard construction and environmental pollution.
  - This lack of strategic foresight contributes to the rise of informal settlements, where India's **slum population is still estimated at 236 million (2020)**, suggesting a severe housing and planning crisis.
- **Acute Environmental Pollution and Resource Stress:** Indian cities grapple with alarming levels of **air and water pollution**, coupled with **increasing resource stress, particularly water scarcity, exacerbated by climate change impacts.**
  - Unregulated industrial emissions, traffic congestion, and poor waste management practices contribute to a declining urban environment and severe public health risks.
  - The air quality index (AQI) **in multiple major cities**, particularly in Delhi, frequently breaches the **'Severe' category** during peak seasons, with particulate **matter (PM2.5) levels well above safe limits.**
  - Furthermore, according to current government estimates, India generates around **65 million tonnes of waste each year**, of which over 62 million tonnes is **Municipal Solid Waste (MSW)** including organic waste and recyclable materials such as paper, plastic, wood, and glass.
    - However, **only 75–80% of this waste is collected, and just 22–28% is scientifically processed or treated, while the rest ends up in dumpsites.**
    - By 2031, **Municipal Solid Waste generation is expected to rise to 165 million tonnes,** and could reach 436 million tonnes by 2050.

- **Fragmented Governance and Institutional Capacity Gaps:** Urban governance is plagued by a **multiplicity of agencies (ULBs, state-level parastatals, and special-purpose vehicles)** with overlapping jurisdictions, leading to poor coordination, fragmented policy implementation, and low accountability.
  - This institutional complexity severely hampers efficient project execution and service delivery.
  - The core issue of autonomy is evident, as city governments often lack the **"three Fs"** (**Functions, Finances, and Functionaries**), with many essential services managed by state-controlled parastatals.
    - A recurring example is the inability of city municipalities (like the MCD in Delhi) to effectively manage issues like monsoon street flooding or solid waste disposal, where responsibility is **often split between the municipal body, the state's Public Works Department (PWD), and specialized state-run agencies** (like water boards or development authorities), resulting in blame-shifting and delayed resolution.
- **Climate Vulnerability and Disaster Risk:** Indian cities are increasingly vulnerable to **extreme weather events** like floods, heat waves, and cyclones, a risk amplified by poor infrastructure planning, encroachment on natural drainage systems, and the **Urban Heat Island (UHI) effect.**
  - A **World Bank report** estimated that annual losses from **pluvial (stormwater) urban flooding** are currently at approximately **$4 billion per year**, a figure projected to rise to **$5 billion by 2030** without remedial action.
  - The UHI effect is significant; a 2023 study found that cities like **Mumbai and Delhi** already experience dangerously high and rising average summer temperatures due to **rapid concrete paving and loss of green cover.**
    - Integrating climate resilience into urban planning is an urgent, underfunded necessity.

What Measures can be Implemented to Strengthen India's Transition Toward Sustainable Urban Development?

- **Integrated Blue-Green Urban Planning:** Strengthening sustainable urban development requires embedding **blue–green infrastructure**, **urban wetlands, green corridors, permeable surfaces**, directly into master plans rather than treating them as add-ons.
  - Cities must shift from piecemeal landscaping to **ecosystem-based adaptation**, integrating natural water channels and biodiversity nodes into zoning norms. This would enable climate-resilient drainage, heat mitigation and biodiversity regeneration.
  - Such planning should be codified into **urban by-laws**, **ensuring mandatory ecological audits for new projects.** Over time, this transforms cities into **nature-positive urban systems** engineered for environmental stability.
- **Urban Transport Decarbonisation Through Multimodal Integration:** India's urban transition must adopt a **multimodal mobility framework** that synchronizes metro networks, e-buses, cycling lanes, and walking districts.
  - This demands unified ticketing platforms, **mobility-as-a-service systems**, and **first–last mile micro-mobility hubs**.
  - Local bodies need to redesign arterial roads for **complete-street principles**, moving away from car-centric norms.
    - Introducing **urban freight zones and EV-ready logistics corridors** further enables low-carbon movement. Together, this shifts mobility from fragmented assets to a **seamless low-emission mobility ecosystem**.
- **Circular Urban Resource Management:** Cities need structured **circularity protocols** for materials, water, and energy to reduce linear consumption.
  - Urban local bodies can establish **"circular districts"** where construction materials,

greywater, and organic waste are **recaptured, repurposed, and reinjected** into city loops.

- **Mandatory material recovery facilities, decentralized biomethanisation, and greywater reclamation plants** can anchor this cycle.
  - Embedding circularity standards in building codes would ensure lifecycle accountability. This cultivates **resource-efficient, regenerative urban metabolism**.

- **Climate-Smart Urban Governance and Fiscal Reform:** Sustainable urbanism requires **climate-oriented governance**, where municipal budgets, audits, and land-use decisions are aligned with resilience metrics.
  - Cities should adopt climate budgeting, green municipal bonds, and **performance-linked climate funds** tied to adaptation and mitigation outcomes. Strengthening urban data stacks can enable predictive governance for floods, heatwaves, and pollution.
  - Building a cadre of trained urban climate officers ensures institutional continuity. Over time, cities evolve into **anticipatory, financially empowered climate-governance entities**.
- **Digital Twin–Enabled Urban Management:** Using **digital twins**, **virtual replicas of city systems**, can revolutionize planning, disaster response, and infrastructure optimization.
  - **Municipalities can simulate traffic flows,** drainage capacity, heat islands, and utility networks under multiple scenarios.
    - This enables evidence-based zoning, **risk-sensitive land-use regulation**, and quicker emergency responses.
  - An integrated sensor ecosystem ensures real-time feedback loops between physical and digital layers.
    - Such smart governance transforms cities into **predictive, data-guided urban systems**.
- **Inclusive Urban Social Infrastructure Clusters:** Sustainable development must prioritize **human-centered inclusivity**, ensuring tightly integrated clusters of health, education, care facilities, and **public spaces within 15-minute access.**
  - Cities can reorganize land around **community-centric service hubs** that reduce mobility burdens and enhance social equity.
  - Strengthening **rental housing, worker hostels, and gender-sensitive design enhances urban livability.**
    - Embedding participatory planning forums empowers local voices. This aligns cities with **equitable, people-first urban frameworks**.
- **Renewable-Integrated Utility Architecture:** Urban utilities must evolve into **distributed, resilient, renewable-integrated systems**, reducing dependency on centralized grids.
  - Rooftop solar, urban microgrids, and energy-storage nodes can be integrated with smart meters for dynamic demand management. Water utilities should adopt solar-run pump systems and **energy-efficient treatment lines**. Waste-to-energy modules can complement renewable supply.
  - Such decentralized clean utility architecture enhances reliability while steering cities toward a **low-carbon, self-sustaining urban energy ecosystem**.
- **Establish Metropolitan Planning and Regional Governance Authorities:** Mandate the establishment of powerful **Metropolitan Planning Authorities (MPAs)** with statutory backing, extending jurisdiction beyond municipal limits to comprehensively include surrounding **peri-urban and census towns**.
  - These MPAs must be given the exclusive authority for integrated **regional spatial planning, infrastructure coordination, and climate adaptation strategies** across the entire functional economic area.
  - This overcomes fragmented governance by creating a unified command structure that can holistically manage issues like water supply, mass transit, and waste management at a regional scale.

Conclusion:

A sustainable urban future for India hinges on **shifting from fragmented, reactive growth to integrated, climate-resilient, and human-centred urbanism driven by empowered institutions and design-led governance.** By embedding circularity, clean mobility, digital intelligence, and inclusive service delivery into city systems, India can transform rapid urbanization into a long-term developmental asset. This holistic trajectory directly advances **SDG 11 (Sustainable Cities), SDG 9 (Infrastructure), SDG 13 (Climate Action), and SDG 6 (Water & Sanitation),** aligning urban growth with global sustainability commitments.

Reimagining India'S Export Pathway

This editorial is based on "Export subsidies will help but we should aim to be globally competitive" which was published in The Hindu Business Line on 16/11/2025. The article brings into picture the limits of India's new export support schemes, noting that despite fresh funding, deep-rooted issues such as high logistics costs, regulatory hurdles, and weak trade integration persist. It argues that meaningful export growth will come from structural reforms and stronger global value chain participation rather than subsidies alone.

Tag: GS Paper - 2, Government Policies & Interventions, GS Paper - 3, Achievements of Indians in Science & Technology, Liberalization, Fiscal Policy, Growth & Development

The **Government of India** has unveiled the **₹25,060 crore Export Promotion Mission and a ₹20,000 crore Credit Guarantee Scheme for Exporters,** but past trends call for measured optimism. Despite multiple export-support initiatives over the last decade, **India's merchandise exports have struggled to achieve even a 3% CAGR, and its global market share remains stagnant at around 1.8%.** The core issue lies in **India's eroding export competitiveness, driven by high logistics costs, regulatory complexities and inverted duty structures**. Sustainable export growth will depend on deeper structural reforms, regulatory simplification, trade facilitation, and stronger integration with global value chains, rather than on subsidies alone.

What Significant Developments Are Transforming India's Export Landscape?

- **Rise of High-Tech and Value-Added Exports:** The Production-Linked Incentive (PLI) scheme is fundamentally **reshaping India's merchandise export basket** by promoting advanced manufacturing, moving beyond traditional low-value goods.
  - This strategic push into high-tech sectors is crucial for integrating India deeper into **global value chains (GVCs)** and achieving greater resilience.
  - The **Electronics Goods** segment surged dramatically by **32.47%** to reach **USD 38.58 Billion** in FY 2024-25, up from USD 29.12 Billion in FY 2023-24, showcasing the **tangible impact of the PLI scheme and positioning the sector as the third-largest export category.** (As per Electronics and Computer Software Export Promotion Council (ESC) and the Ministry of Commerce & Industry)
- **Sustained Momentum in Services Exports:** India maintains its leadership in the global services sector, which acts as a **robust counterbalance to the cyclical volatility of merchandise trade,** highlighting the strength of its skilled human capital and digital economy.
  - This resilience is vital for maintaining the overall export momentum and a positive current account balance in the face of slowing global goods demand.
  - **Services exports** reached a record **USD 387.5 Billion** in **FY 2024-25**, a strong **13.6%** growth over the 2023-24 period, primarily driven by the consistent performance of **IT and BPO services**.
- **Aggressive Pursuit of Free Trade Agreements (FTAs):** Strategic bilateral agreements are being rapidly finalized to **secure preferential market access, counter rising protectionism, and diversify trade partners** away from concentrated high-risk regions.

- These pacts are essential for lowering tariff barriers on Indian goods, giving exporters a competitive edge in key developed and developing markets.
- The **India-UK Comprehensive Economic and Trade Agreement (CETA)** and the recently operational **India-EFTA (European Free Trade Association) FTA** are significant, with the UK pact, targeting an increase in bilateral trade to **USD 120 billion by 2030**.

- **Policy Focus on Non-Petroleum, Non-Gold Exports (NPG):** The emphasis on **non-oil and non-gold merchandise** exports signifies a healthier, diversified, and more sustainable export base, reducing reliance on volatile commodity prices.
  - This diversification into new products and new markets strengthens India's global footprint and insulates the economy from external shocks related to energy and bullion.
  - **Non-petroleum exports** rose by nearly **4%** to **USD 219.90 Billion** in April-October 2025, supported by strong growth in key diversified segments like **Meat, Dairy & Poultry Products** and **Marine Products**.
- **Strengthening of Logistics and Trade Infrastructure:** The launch of the **National Logistics Policy (NLP)** and the **PM GatiShakti National Master Plan** aims to drastically reduce the high logistics cost for Indian exporters, enhancing their global price competitiveness.
  - Improving connectivity through multi-modal infrastructure is paramount to achieving the ambitious export targets and streamlining supply chains from factory to port.
  - The policy aims to bring down logistics costs to a globally competitive level and improve India's rank in the **World Bank's Logistics Performance Index (LPI)** to among the **top 25 countries by 2030**, a crucial step for easing the movement of goods.
- **Export Promotion Mission and Trade Finance Support:** The government has launched **comprehensive, outcome-driven missions** to address critical pain points, particularly access to affordable finance and global market navigation for MSMEs, which form the backbone of Indian exports.
  - This structured, single-mechanism approach, including the **Export Promotion Mission (EPM)**, replaces fragmented schemes to respond rapidly to global trade disruptions, ensuring trade continuity.
  - The new **Rs 25,060-crore EPM** is being rolled out from 2025-26, with a significant component for **Niryat Protsahan** aimed at improving **MSME access to affordable trade finance** through tools like interest subvention and credit enhancement.
- **Resilience Amidst Global Trade Headwinds:** Indian exporters are demonstrating significant adaptability, utilizing **policy support and diversifying their markets to maintain positive growth despite widespread global demand softness and new tariff barriers from major partners.**
  - The mixed performance underscores the need for continuous agility and policy support to mitigate the impact of external protectionism and geopolitical tensions.
  - Despite an **8.58% decline** in exports to the US in October 2025 (compared to October 2024) following new tariffs, India's overall **Total Exports (Merchandise + Services) for FY 2024-25 grew by 6.01%** to a record **USD 824.9 Billion**, demonstrating underlying resilience.

What are the Key Issues Associated with India's Export Sector?

- **High Logistics and Transaction Costs:** India's domestic logistics costs remain a major competitive disadvantage, **eroding exporter margins and increasing the cost of goods sold on the international market**, making them less attractive than those from efficient East Asian competitors.
  - The fragmented logistics network, compounded by bureaucratic delays, contributes significantly to **higher inventory holding and slower turnaround times, which directly impacts the export price.**

- While recent studies show an improvement, the logistics cost **is still estimated at around 7.97% of GDP (2023-24),** which is significantly higher than the global benchmark of **6-7% for developed nations,** severely impacting the price competitiveness of Indian manufactured goods.

- **Shallow Integration into Global Value Chains (GVCs):** Indian manufacturing firms, especially MSMEs, have **low participation in high-value, backward linkages of global supply chains,** primarily serving as **'final product' exporters** rather than integrated component suppliers.
  - This low integration **prevents exporters from benefiting from technology transfer,** scale economies, and global design networks, limiting the value addition and diversification of the export basket.
  - As a result, India captures a much smaller share of GVC income compared to competitors like **Vietnam or Mexico.**
- **Impact of Global Demand Slowdown and Protectionism: Softening global demand in key developed markets (EU and US)** and a rise in targeted tariffs and trade-restrictive measures have directly impacted demand for India's labour-intensive and traditional export goods.
  - This external pressure creates significant volatility, forcing exporters to diversify rapidly but often resulting in short-term export contraction in established markets.
  - India's overall **Merchandise Exports** contracted sharply by **11.8% year-on-year in October 2025.**
  - The slowdown has particularly hurt sectors like textiles, leather, and engineering goods, which depend heavily on Western markets.
    - **Rising geopolitical fragmentation is further reshaping global value chains,** making export recovery more uncertain and uneven across sectors.
- **Difficulty in Accessing Affordable Export Finance for MSMEs:** Micro, Small, and Medium Enterprises (MSMEs), which contribute **nearly half of India's exports**, face persistent challenges in securing timely and affordable pre- and post-shipment credit.
  - Banks perceive MSME trade finance as high-risk due to delayed payment cycles and collateral requirements, hindering their ability to execute large or long-term export orders efficiently.
  - This persistent challenge is quantified by the fact that the credit gap in the MSME sector was recently estimated to be in the **range of ₹20 to ₹25 lakh crore, with about 47% of MSME credit demand remaining unmet.**
- **Growing Threat of Non-Tariff Barriers (NTBs):** Indian exporters are increasingly facing market access challenges through **stringent Non-Tariff Barriers (NTBs) related to product standards, Sanitary and Phytosanitary (SPS) measures,** and complex certification processes in developed markets.
  - Compliance with evolving global quality and environmental standards, such as the EU's Carbon Border Adjustment Mechanism (CBAM), is a high-cost hurdle for many small exporters.
  - Although **India's CBAM-exposed exports to the EU account for only 0.2% of the country's GDP**, iron and steel make up nearly **90% of these exports and these sectors are now exposed to a new compliance cost, which could translate into** higher taxes for exporters lacking certified green production processes.
- **Sub-optimal Utilization of Free Trade Agreements (FTAs):** Despite signing new FTAs with partners like the UAE and Australia, the **actual utilization rate by Indian exporters remains low due to complex Rules of Origin (RoO) requirements,** lack of awareness, and administrative overheads. .
  - Studies consistently indicate that the **utilisation rate of India's existing FTAs is often below 25%**, meaning a significant volume of exports could be entering partner countries at lower tariffs if exporters fully complied with the necessary documentation and local value-addition rules.

What Measures Can Drive a Sustainable Transformation in India's Export Sector?

- **Build a "Next-Generation Trade Facilitation Ecosystem":** India must move toward a seamless, paperless, **single-window trade environment** integrating **customs, ports, GST, standards bodies, and banks to eliminate friction across the export lifecycle.**
  - A **unified digital interface** should leverage **AI-based risk assessment**, automated approvals, real-time cargo tracking, and predictive clearance systems to reduce compliance uncertainty.
  - **Harmonising border procedures** across states and ports will remove the current fragmentation. Such a system institutionalized **time-cost efficiency**, promotes regulatory predictability, and enhances India's reliability as a trading partner.
    - This creates an ecosystem where exporters operate with minimal bureaucratic drag and maximum transparency.
- **Accelerate Deep Integration into Global Value Chains (GVCs):** India needs targeted policies to attract **component manufacturing, design-intensive processes, and cross-border production mandates**, moving beyond final-assembly exports. Strategic co-location of supplier networks, harmonised standards, and plug-and-play industrial clusters can anchor India into higher-value GVC nodes.
  - Long-term supplier development programmes with global anchor firms can foster **technology diffusion** and operational benchmarking.
  - **Stronger intellectual property protection** and regulatory stability will make India a credible destination for multi-stage production. This approach ensures that export growth is value-rich, diversified, and resilient.
- **Shift from Subsidy-Led to Capability-Led Export Growth:** Rather than short-cycle incentives, India must invest in **institutional export capabilities**, design expertise, product certification, advanced testing labs, and quality upgradation systems.
  - A nationwide programme for **export quality assurance** can reposition Indian products as premium, not low-cost alternatives.
  - Support for **green transition, eco-labeling, and sustainability compliance** will future-proof Indian exporters against emerging global norms.
    - **Capacity-building for MSMEs in packaging, branding, after-sales services, and intellectual property** can raise global brand credibility.
    - This shift nurtures a long-term competitiveness culture instead of reliance on fiscal support.
- **Create a Robust, Affordable Trade Finance Architecture:** A structural reform is needed to expand **risk-mitigated export credit**, using **blended finance, digital underwriting, and alternative credit-scoring models based on supply-chain behaviour.**
  - India should scale **fintech-enabled trade finance platforms** that integrate exporters, banks, insurers, and customs, reducing collateral dependence.
  - A **dedicated export credit guarantee** hub with risk-sharing mechanisms can reduce bank aversion to MSME trade lending.
    - Policy stability in interest equalisation and predictable refinancing windows can improve working capital flow. These measures ensure that liquidity constraints never throttle export potential.
- **Strategically Expand Market Access and Mitigate Non-Tariff Barriers:** India must adopt a proactive **regulatory diplomacy strategy** to **anticipate, negotiate, and harmonise** standards with major export destinations.
  - Building domestic capacity for conformity assessment, sustainability certification, and carbon accounting will help exporters meet evolving **NTB/BAT (Border Adjustment Tax) requirements.**
  - FTAs should be complemented by **real-time support cells that guide exporters on Rules of**

Origin, digital documentation, and compliance navigation.

- Strengthening **India's voice in global standard-setting forums** can reduce adverse regulatory spillovers. This creates a globally aligned export ecosystem that is competitiveness-ready.

- **Develop High-Productivity, Competitive Export Clusters:** India should design **sector-specific export ecosystems** with integrated logistics, plug-and-play manufacturing, embedded skill centres, and customs facilitation zones.
  - Cluster governance must be led by **professional agencies with autonomy, performance benchmarks, and real-time problem-solving authority.**
  - Shared infrastructure-tool rooms, testing labs, R&D centres, and common logistics hubs-can drastically reduce cost disabilities.
  - Collaboration among **industry, academia, and global firms** can enable continuous innovation cycles. This spatial concentration boosts scale, reduces transaction costs, and creates globally benchmarked export hubs.
- **Build a Future-Ready Workforce for Global Trade:** India needs a national **Export Skills Mission** focusing on logistics management, advanced manufacturing skills, cross-cultural communication, digital trade, sustainability compliance, and supply-chain analytics.
  - **Export-linked skilling** should be embedded in industrial clusters, SEZs, and training institutes with partnerships from global manufacturers.
  - A dedicated cadre of **export managers, compliance specialists, and digital-trade professionals** can enhance firm competitiveness.
    - Continuous learning frameworks and certification programmes will align Indian workers with global industry norms. **A skilled workforce becomes the backbone of a resilient, innovation-driven export transformation.**

Conclusion:

India's export revival will hinge not on episodic incentives but on **deep structural reforms, capability creation, and seamless global integration.** Strengthening logistics, compliance readiness, financial architecture, and workforce skills can convert India's scale into true competitiveness. A resilient export ecosystem requires policy stability, institutional coherence, and continuous innovation. ***"Nations don't win in markets by subsidies, but by systems- where efficiency becomes culture and competitiveness becomes character."***

Implementing Labour Reforms in India

This editorial is based on "New labour codes are long overdue & welcome", which was published in The Indian Express on 24/11/2025. The article argues that India's new labour codes are a long-overdue but welcome step towards simplifying an overly complex regulatory framework, promoting formalisation and worker protection, and must be followed by broader, urgent reforms to reduce compliance burdens and support growth

Tag: GS Paper 3, Industrial Policy, Industrial Growth, Planning, Mobilisation of resources, Infrastructure, GS Paper 2, Human Resource, Skill Development

As India prepares to implement its **new labour codes**, it stands at a decisive moment in redefining the **social contract** between the **state, workers, and enterprises**. The **consolidation of 29 fragmented labour laws** into a more **coherent and predictable framework** holds the promise of **wider social security**, greater **formalisation**, and enhanced **inclusion of women and gig workers**. However, this ambitious transformation unfolds within a persistent ecosystem of **complex compliance requirements** that continue to deter **scale**, **investment**, and the creation of **productive jobs**.

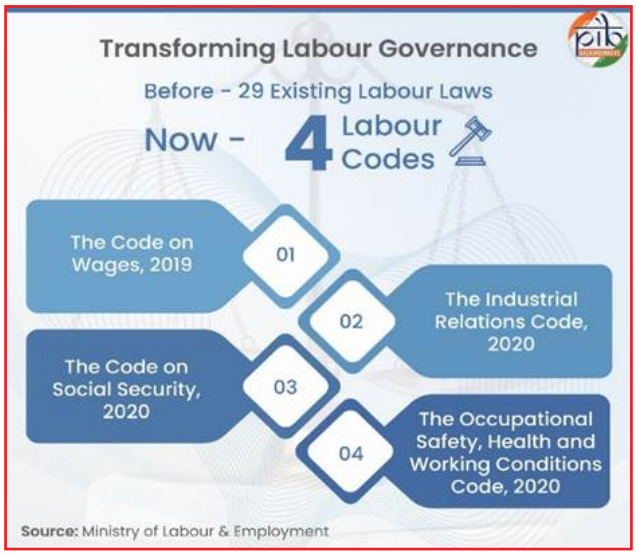
What are the Key Features of the New Labour Codes in India?

- **Code on Wages, 2019:** The Code merges four wage-related laws to create a **single, uniform wage**

system for all workers, including those in the unorganised sector.

- It guarantees a **statutory minimum wage**, backed by a **national floor wage** below which states cannot fix wages.
- The minimum wage fixation now considers skill levels, geographical differences, and working conditions, ensuring fairness across all sectors.
- The Code promotes **gender-neutral employment**, mandates **timely wage payments**, and ensures **overtime at twice the normal rate**.
- Compliance becomes simpler through a **uniform wage definition**, a friendly **Inspector-cum-Facilitator system**, and **monetary penalties** instead of criminal prosecution for minor offences.

- **Industrial Relations Code, 2020:** This Code streamlines the laws on trade unions, industrial disputes, and standing orders, aiming for **industrial harmony, predictability, and labour flexibility**.
  - It formalises **Fixed Term Employment**, granting contract workers full wage parity and gratuity after one year.
  - The threshold for layoffs, retrenchment, and standing orders rises from **100 to 300 workers**, making scaling easier for industries.
  - Collective bargaining becomes stronger through formal **negotiating unions/councils**, while disputes are settled faster through enhanced **Industrial Tribunals** and direct access after failed conciliation.
  - The Code regulates strikes with a **14-day notice**, recognises "mass casual leave" as strike action, and encourages full **digitisation of employment records**.
- **Code on Social Security, 2020:** This Code consolidates nine social security laws and extends social protection to **unorganised workers, gig workers, and platform workers**, marking a major expansion in India's welfare net.
  - It widens **ESIC coverage nationwide**, mandates it for hazardous occupations, and simplifies EPF procedures with **time-bound inquiries** and lower appeal deposits.
  - Gig and platform workers are included through mandatory **aggregator contributions** and a dedicated **Social Security Fund** covering life, health, maternity, and old-age benefits.
  - The Code creates a **uniform definition of wages**, covers **commuting accidents** under employment injury, and grants gratuity to fixed-term employees after one year.
  - Compliance becomes easier through **digital records, randomised inspections**, and compounding of minor offences.
- **Occupational Safety, Health and Working Conditions (OSH) Code, 2020:** The OSH Code merges 13 laws to create a **unified, modern framework for workplace safety, health, and welfare**.
  - It introduces **one registration, one licence, and one return** for establishments, significantly reducing paperwork and compliance burden.
  - Coverage is expanded to even single-employee hazardous establishments, while migrant workers benefit from **travel allowances, PDS portability, and inclusion in a national database**.
  - The Code promotes **women's employment** by allowing night work with safety measures and mandates **annual health check-ups** and formal appointment letters for all workers.
  - It strengthens workplace safety through **safety committees**, a national **OSH Advisory Board**, and higher thresholds for factory applicability.
  - Working hours are fixed at **8 hours/day and 48 hours/week**, backed by a shift from imprisonment to **monetary penalties** for violations.



What are the Major Challenges Faced in Governing Labour Issues in India?

- **Fragmented and Complex Regulatory Environment:** Prior to consolidation, India had **29 central labour laws**, many **overlapping and contradictory**.
  - The large number of rules was a major **compliance burden**; studies estimate firms faced **over 69,000 compliances annually** under **1,536 legal provisions**.
  - This **excessive complexity**, especially for **MSMEs**, discouraged **formalisation** and **compliance**.
  - Even after consolidation into **four codes**, **uneven state-level rules** and **slow adoption of unified digital platforms** perpetuate **regulatory fragmentation**.
  - State labour departments are often **understaffed** and lack capacity for **monitoring**, **inspection**, or **dispute resolution**.
- **Large Informal Workforce:** More than **90% of Indian workers** remain **informal**, lacking access to **minimum wages** or **social security**.
  - **Micro and small enterprises** often perceive **formal registration** and **compliance costs** as outweighing benefits.
  - The labour codes extend **social security** and **formal employment frameworks** to **gig, platform, migrant, and fixed-term workers**, but these entitlements require **on-ground enforcement**, **employer buy-in**, and **incentives** for **micro-businesses** that dominate the informal economy.
- **Low Female Labour Force Participation: Female labour force participation** in India rose to **41.7% in 2023–24**, but a disproportionate number of women remain concentrated in **agriculture** and **informal sectors**, limiting access to **high-paying** and **stable jobs**.
  - The share of rural women working in **agriculture** increased from 71.1% in 2018–19 to 76.9% in 2023–24, while their participation in **industry** and **services** declined. This shift has been exacerbated by **social norms**, **safety concerns**, and the **lack of supportive infrastructure** such as childcare facilities.
  - Though the codes allow women to **work night shifts** and mandate **equal pay**, **structural barriers** persist, requiring investments in **safe transport**, **workplace facilities**, and **community awareness**.
- **Inclusion of Gig and Platform Workers:** Gig and platform work is **growing rapidly** but remains **poorly regulated**.
  - The labour codes legally recognise **gig workers** and require aggregators to contribute **1–2% of turnover** to **social security**, yet specifics for **portable benefits**, **minimum guarantees**, or **claim processes** are still evolving.
  - There is a need for **innovative**, **platform-agnostic**, **digitally-enabled benefit systems** suited to the **gig economy**.
- **Youth Unemployment and Skill Mismatch: Despite India's demographic dividend**, **youth unemployment** remains a critical challenge, with the **youth unemployment rate** (ages 15–29) hovering around **14.6%**, nearly **three times** the **national average**.
  - **Female youth unemployment** is even higher at **17.8%**, indicating persistent **gender disparities**.

- Additionally, **urban youth unemployment** remains more **volatile** and elevated, at nearly **19%**, underscoring structural labour-market gaps.
- Education and vocational training often **do not match industry needs**.
- While the codes include **reskilling funds** and **skill development responsibilities**, **on-ground execution** remains limited, particularly for **informal and contract workers**.

Resistance from Trade Unions and Political Opposition: Labour reforms face **resistance from trade unions** fearing **erosion of worker protections**, citing concerns over **layoff thresholds** and **fixed-term contracts** viewed as **precarious**.

- Ten large trade unions have strongly opposed the four new labour codes implemented in November 2025, calling them **"anti-worker"** and a **"deceptive fraud,"** alleging a significant **erosion of worker protections**.
- These **conflicting pressures** cause **protests**, **delayed state notifications**, and hinder **consensus-building** necessary for smooth implementation.

Data Poverty and Policy Blindspots: India's labour governance suffers from severe **data poverty**, with **outdated, fragmented, and incomplete labour statistics**.

- The absence of a **unified Labour Market Information System (LMIS)** limits real-time, evidence-based policymaking.
- Key surveys like **PLFS** and **NSSO** fail to fully capture the **90% informal workforce**, while **migration data** remains weak despite migrants forming **one-third** of the labour force.
- Structural policy blind spots persist as **labour rigidity**, **compliance burdens**, and **credit constraints** prevent small firms from scaling, creating the **"missing middle"**, a landscape dominated by micro-units and a few large firms, with very few **medium-sized enterprises** that generate stable jobs.

FOUR NEW LABOUR CODES

1. Many labour laws enacted before and just after Independence were "designed for an economy very different from today" and are hence obsolete.

2. Since this is a subject on the concurrent list, states have come out with their own laws, and the absence of a central code "results in a fragmented approach, restricts uniform social security benefits to workers across the nation, and increases compliance confusion for employers."

WHY WORKERS NEED THEM

- Limited social protection, specially for contractual and unorganised workers
- Lack of formal recognition for workers across segments such as gig and platform workers, leading to unfair treatment and no social security
- Absence of uniform standards in wages

WHY EMPLOYERS NEED THEM

- Multiple labour laws hamper business efficiency
- Heavy compliance burden is discouraging FDI inflows
- Excessive regulatory and compliance requirements adversely impact businesses expansion and formalisation of work

SOURCE: LABOUR MINISTRY

What are the Key Government Schemes Aimed at Ensuring Labour Welfare in India?

- **Pradhan Mantri Shram Yogi Mandhan (PM-SYM)**: Provides a minimum monthly **pension of Rs. 3000** to **unorganized sector workers** after 60 years of age.
- **e-Shram Portal** : A **national database** for unorganized workers to facilitate **social security** and welfare scheme delivery across **400+ occupations**.
- **Atmanirbhar Bharat Rojgar Yojana (ABRY)** : **Incentivizes employers** for **job creation** and restoration post-COVID-19, with benefits claimed by over **1.5 lakh establishments** covering **60 lakh beneficiaries**.
- **National Career Service (NCS)** : An **integrated online platform** connecting **job seekers** with **employers**, **skill training**, and **career counseling** services.
- **Employees' Provident Fund Organisation (EPFO) schemes** :Expanding **membership** and **benefits coverage** with increased **claim settlements**.
- **Employees' State Insurance (ESI)**: Providing **health** and **social security** to workers across more than **600 districts** with **3.1 crore insured persons**.
- **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)**: Guarantees **100 days of paid rural employment** to boost **livelihood security** with an allocation of **Rs 86,000 crore** for FY 2025–26.
- **Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY)** and **Pradhan Mantri Suraksha Bima Yojana (PMSBY)**: **Affordable life** and **accident insurance** schemes covering **millions of workers**.
- **Pradhan Mantri Viksit Bharat Rozgar Yojana**: Launched in 2025 to create over **3.5 crore new jobs** through **employer and employee incentives** with a budget of nearly **Rs. 1 lakh crore**.

What Measures can India Adopt to Strengthen Labour Governance in India?

- **Simplify and Digitize Compliance Procedures:** India must accelerate the implementation of **unified digital platforms**, **single registration**, **licensing**, and **consolidated returns** to reduce the overwhelming **compliance burden**.
  - Drawing lessons from countries like **Singapore** and **South Korea**, where **integrated digital labour portals** ease employer compliance, India can reduce **paperwork** and promote **formalisation**.
  - The government should expedite **state-level notifications** and provide **technical support to MSMEs** for digital adoption, fostering a **culture of compliance**.
- **Promote Formalisation with Incentives for Micro and Informal Enterprises:** To bring over **90% informal workers** into the formal sector, **financial and regulatory incentives** like **tax relief**, **access to credit**, and **simplified procedures** should be offered to bridge the **"missing middle"** in India's industrial structure.

- Models from **Brazil** and **Indonesia** show that formalisation accelerates when accompanied by **social security benefits** and **reduced compliance costs**.
- Linking formalisation to targeted schemes such as **MUDRA loans** and **digital identity-based social security** can encourage **voluntary registration** and contribute toward **inclusive growth**.

- **Enhance Women's Labour Participation through Infrastructure and Social Support**: Beyond legal provisions in labour codes, India must invest in **safe and affordable transport**, **gender-segregated workplace amenities**, and **quality childcare facilities** as prioritized in the **National Gender Resource Centre** framework.
  - **Public campaigns** to shift **societal attitudes** alongside strengthening laws against **workplace harassment (POSH Act)** are critical.
  - International examples from **Scandinavian countries** indicate that such **holistic support** significantly improves **female labour participation**.
- **Innovate Social Security Frameworks for Gig and Platform Workers:** The **gig economy's** dynamism requires designing **portable**, **technology-driven social security schemes** with minimal **administrative friction**.
  - India should institutionalize **aggregator contributions** with **transparent, blockchain-enabled benefit tracking**, inspired by pilots in the **EU** and **Canada**.
  - **Government-backed digital wallets** and apps to access **health**, **retirement**, and **insurance benefits** can enhance **coverage** and **trust among gig workers**.
- **Strengthen Enforcement Capacity with Training and Technology:** Investing in **capacity building** of state labour departments is vital to close **enforcement gaps**.
  - This involves recruiting **skilled inspectors**, providing **digital inspection tools** and **AI-enabled analytics** for **real-time monitoring**.
  - Establish a **unified, real-time LMIS** and strengthen data on informal and migrant workers to enable accurate, evidence-based labour policymaking.
  - **Collaborative platforms** for grievance redressal and **dispute resolution**, modeled on the **Labour Courts of Germany**, can increase **transparency** and **worker confidence**. **Regular audits** and **independent assessments** will ensure **adherence** and **accountability**.
- **Align Skill Development with Labour Market Needs:** Expanding and aligning **vocational training** under schemes like **Pradhan Mantri Kaushal Vikas Yojana (PMKVY)** with evolving **industry requirements** is crucial to resolve **youth unemployment**.
  - Partnerships with **industry associations** for **apprenticeships**, and leveraging **Artificial Intelligence** for personalized **skill mapping** and **training recommendations**, can raise **employability**.
  - International apprenticeship frameworks, such as **Germany's dual system**, offer valuable blueprints.
- **Engage and Build Consensus with Trade Unions and Employers:** Sustained **dialogue platforms** involving **labour unions**, **employers**, and **government** at state and national levels can balance **worker protections** with **business flexibility**.
  - Lessons from the **UK's social dialogue model** highlight how **tripartite agreements** support smoother **implementation** and **acceptance of reforms**.
  - **Transparent communication** on the benefits of the new labour codes, coupled with **grievance redressal mechanisms**, can mitigate **resistance**.

Conclusion:

India's new labour codes mark a transformative step in **modernising labour governance**, promoting **formalisation**, **social security**, and **inclusion**. As **ILO Director-General Gilbert F. Houngbo** states, "**Social**

dialogue among **government**, **employers**, and **workers** is essential to ensure reforms benefit both workers and businesses." Moving forward, India must prioritize **cooperative federalism**, **digital compliance**, and **inclusive skilling** to bridge gaps between **policy and practice**, enabling a **resilient workforce** that drives **equitable economic growth**.

COP30: Bridging Gaps in Global Climate Action

This editorial is based on " **At COP 30, a divided world finds common ground,"** ***which was published in The Indian Express on 25/11/2025. The article discusses how COP 30, despite global divisions and challenges, achieved significant multilateral cooperation by aligning diverse country interests to advance climate adaptation, just transition mechanisms, and equitable energy shifts while balancing economic and social complexities.***

Tag: GS Paper 3, Environmental Pollution & Degradation, Environmental Impact Assessment (EIA), Sustainable Development, Climate Change, GS Paper 2, Groupings & Agreements Involving India and/or Affecting India's Interests

COP 30 marked a critical juncture in **global climate action**, demonstrating the power of **multilateral cooperation** despite geopolitical tensions. The conference saw **historic finance commitments**, pledges to **triple adaptation funding by 2035**, and launched innovative initiatives for a **just transition** and **deforestation reversal**. While falling short on **fossil fuel phase-out** language, COP 30 reinforced the urgent need for ambitious, **equity-based climate strategies** that blend **social, economic, and environmental goals** in a **collaborative global framework**.

What are the Key Outcomes of COP30 in Belém, Brazil?

- **Adoption of the Belém Package:** COP30 saw the adoption of the **Belém Package,** comprising **29 decisions** aimed at accelerating **Paris Agreement implementation** by strengthening **climate finance**, **adaptation tracking**, **gender inclusion**, and **global cooperation**.
  - This package reflects a shift from **pledges to actionable implementation**.
- **Climate Finance Commitments and Adaptation Funding:** Parties have committed to mobilising $1.3 trillion annually by 2035 for climate action, spotlighting a tripling of adaptation finance to support vulnerable nations and addressing long-standing **finance gaps** in previous agreements.
- **Global Implementation Accelerator** and **Belém Mission to 1.5°C:** Launched to monitor national progress toward climate targets, these initiatives aim to narrow the **emissions gap** by facilitating measurable tracking of **NDCs**, fostering **accountability** and **transparency**.
- **Just Transition Mechanism for Fossil Fuel-Dependent Economies:** Also known as the **Belém Action Mechanism**, it supports workers and countries transitioning away from **fossil fuels** to **sustainable economies**.
- **Roadmaps for Deforestation and Fossil Fuel Transition:** Brazil introduced two key roadmaps: one to **halt and reverse deforestation** and another to advance a **just, equitable fossil fuel transition**, reflecting national and regional **economic realities**.
- **Belém Health Action Plan:** The first-ever global plan linking **climate action** and **public health**, addressing **climate-induced health risks** and emphasising **climate justice**, aiming to strengthen **resilient health systems** worldwide.
- **Tropical Forests Forever Facility:** A **performance-based**, long-term fund rewarding countries for **forest conservation**, allocating at least **20% of funding** to **Indigenous peoples and local communities**, aligning **biodiversity**, **livelihoods**, and **climate goals**.
- **Strengthening Equity and Inclusive Governance:** COP30 reinforced **equity**, **climate justice**, **transparency**, and **intergenerational rights**, while integrating **gender-responsive policies** and **Indigenous leadership**.
- **Climate-Trade Dialogue:** An initiative to harmonise **climate objectives** with **international trade policies**, reducing conflicts such as **carbon border adjustments**, and promoting **sustainable, fair transitions**.

- **Global Mutirão Agreement:** Fostering a spirit of **collective action**, this agreement aims to enhance **multilateralism** and **collective responsibility** amid geopolitical divisions.

What are the Key Barriers that Prevent Countries from Meeting Global Climate Commitments?

- **Gap Between NDC Pledges and Pathway:** Many countries' Nationally Determined Contributions (NDCs) still fall short of what is needed to limit warming to **1.5°C**.
  - The UNEP Emissions Gap Report 2025 states that the current NDCs would only reduce global greenhouse gas emissions by about **15% by 2035** compared to 2019 levels, while a **45%-60% reduction** is required to stay within 1.5°C limits.
  - Only **19 countries** have targets aligned with **Paris goals**, with major emitters like **China** and the **US** planning expansions in certain sectors.
  - This lack of ambition leads to a projected temperature rise of **2.3–2.5°C by 2100**.
- **Implementation Gap:** Even where targets exist, implementation is lagging. Climate Action Tracker reported that global emissions are on track to exceed the necessary reductions by **29-32 Gt CO_2e in 2030**, pointing to a serious **implementation gap**.
  - While **renewable capacity** has been growing, investments in **fossil fuel infrastructure** continue, and many countries delay **phasing out coal**, impacting the speed of **decarbonization**.
  - Many corporations and businesses lag in climate action. A **2025 EY Global Climate Action Barometer** found that while **64%** of companies have **net-zero plans**, only **12%** made substantial progress in 2025.
    - Nearly **two-thirds** rely on **carbon credits** rather than actual emission reductions, especially in **transportation** and **financial services**, undermining broader climate efforts.
- **Insufficient Climate Finance:** Developing countries require substantial funding for **mitigation** and **adaptation** but encounter chronic shortages.
  - Although COP30 pledged **$1.3 trillion annually by 2035**, currently only about **$115 billion per year(by developed countries)** flows as climate finance, well below the **$300 billion target** set for 2020 and future needs.
  - **Adaptation funding** is particularly underfunded, receiving less than **one-third** of required amounts, causing **vulnerable countries** to struggle with climate impacts and **resilience-building**.
- **Geopolitical Tensions and Responsibility Disputes:** Global political divides obstruct consensus on critical issues like **fossil fuel phase-out** and **equitable finance sharing**.
  - COP30 highlighted this with the absence of a binding fossil fuel phase-out agreement.
  - Countries disagree on how to balance responsibilities between **developed and developing nations**, as well as on **monitoring and accountability frameworks**. **US-China cooperation on this issue** has been inconsistent, affecting global momentum.
    - Also, India on behalf of the **Global South** calls for a **phase down** rather than a **phase out** of **fossil fuels**.
- **Technological Constraints and Capacity Gaps:** Access to advanced **clean technologies** is uneven.
  - Many developing countries lack the **infrastructure** and **expertise** to deploy renewables effectively or adopt **carbon capture technologies**. This limits their ability to meet ambitious commitments.
  - For example, **Africa's renewable energy capacity** reached only **70 GW in 2024** compared to over **800GW in Europe**, highlighting widening **technology gaps**.
- **Data Transparency and Reporting Deficiencies:** Accurate, timely data on **emissions** and **climate actions** are crucial for global accountability.
  - Many countries face challenges in comprehensive **greenhouse gas inventories** and **transparent reporting**, weakening trust and impeding policy adjustments.

- The lack of **uniform reporting standards** contributes to inconsistent progress tracking.
  - A study covering **133 developing countries** from **1997 to 2019** found that over half made **little or no progress** in improving their **GHG inventory capabilities**, with many failing to **submit inventories** when required.

- **Socioeconomic and Just Transition Challenges:** Transitioning from fossil fuels affects millions of workers in industries tied to **coal, oil, and gas**.
  - Without sufficient **social protection** and **re-skilling schemes**, resistance grows, delaying policymaking.
  - The **International Labour Organization (ILO)** estimates that around **24 million jobs** will be created in **green sectors** by 2030, but millions more in fossil fuel industries risk displacement, especially in **coal-reliant regions** like Poland, India, and parts of the US.

What Major Initiatives has the Indian Government Undertaken to Meet Its Climate Commitments?

- **National Action Plan on Climate Change (NAPCC):** Launched in **2008**, it includes **eight national missions** targeting **solar energy**, **energy efficiency**, **sustainable habitats**, **water**, **Himalayan ecosystems**, **Green India**, **sustainable agriculture**, and **climate knowledge**.
- **National Solar Mission:** Focuses on increasing **solar power capacity** to reduce **fossil fuel dependency** and promote **clean energy**.
- **National Green Hydrogen Mission:** Aims to produce **5 million tonnes** of **green hydrogen** annually by **2030** to enable **decarbonization** of hard-to-abate sectors.
- **Perform, Achieve and Trade (PAT) Scheme:** Implements **market-based energy efficiency** improvements in industry with **tradable credits** for excess savings.
- **Carbon Market Development:** Establishes a **carbon credit trading scheme** expected by **2026** to incentivize **emissions reductions**.
- **Forest Conservation and Afforestation Programs:** Under NAPCC missions and the **Green India Mission**, India aims to afforest **6 million hectares** and increase **forest cover** from **23% to 33%**.
- **India Cooling Action Plan (ICAP):** Seeks **sustainable cooling** solutions reducing **refrigerant emissions** and **energy use**, improving health and equity.
- **National Bio-Energy Mission:** Promotes **bio-energy** as a **renewable** option to diversify **energy sources** and reduce **emissions**.
- **National Clean Air Programme (NCAP):** Aims to reduce **air pollution** using regulatory measures synergistic with climate goals.
- **Mangrove Initiative for Shoreline Habitats & Tangible Incomes (MISHTI):** Restores **coastal ecosystems** while enhancing **community livelihoods** dependent on **mangroves**.
- **Carbon Capture Utilisation and Storage (CCUS):** Supports industrial **decarbonization** through innovative **CO_2 capture** and **reintegration technologies**.
- **Miyawaki Urban Afforestation Technique:** Propagates **dense native vegetation** in urban areas for improved **green cover** and **air quality**.

What Key Global Actions are Needed to Ensure Equitable and Effective Climate Action Worldwide?

- **Address the Ambition Gap with Stronger NDCs:** Most current **Nationally Determined Contributions (NDCs)** are insufficient to limit warming below **1.5°C**.
  - Countries including India need to adopt more **ambitious, science-based targets**, revising them regularly with **built-in accountability**.
  - For instance, **Colombia's iterative process** of broadening targets with **inclusive stakeholder engagement** exemplifies effective ambition enhancement.
    - Emulating the **EU's legally binding emission cuts** under the **Fit for 55 package** can institutionalize such ambition.
- **Close the Implementation Gap through Robust Governance and Monitoring**: Countries must translate commitments into **enforceable policies** with clear timelines and **compliance incentives**.
  - The **Dominican Republic's National Council for Climate Change** successfully coordinates government departments for cohesive action.
  - India and others can set up or strengthen such **central bodies**, complemented by digital **MRV (Measurement, Reporting, and Verification) systems** to transparently track progress and **penalize underperformance**, thus reducing the global implementation deficit.
- **Scale Up Climate Finance with Transparency and Innovation:** Addressing finance shortfalls requires diverse instruments like **green bonds**, **blended finance**, and **climate funds**. **Zambia's green bonds** and **South Africa's sovereign green bonds** illustrate effective scaling-up strategies.
  - India should foster **domestic green finance markets**, adhere to **UNFCCC reporting standards**, and create **enabling policy environments** that attract private investment, ensuring **adaptation funding** reaches vulnerable populations urgently.
- **Strengthen Multilateral Cooperation and Equitable Responsibility Sharing:** Bridging geopolitical divides involves strengthening **transparency and accountability frameworks** under the **Paris Agreement** while operationalizing **common but differentiated responsibilities (CBDR)**.
  - **Kenya's climate finance unit** and **Thailand's national strategies** showcase successful models for mobilizing support equitably.
  - India's role in **South-South cooperation** is vital for balancing ambition with equity, fostering **trust among diverse actors**.
- **Invest in Technology Transfer and Capacity Building:** Closing technology gaps demands **cooperative R&D**, **capacity-building**, and **technical assistance** schemes.
  - **For instance, Fiji** has built alliances to develop local expertise and adapt technologies. India can expand partnerships like **Mission Innovation** and invest in **vocational training** to accelerate **clean technology adoption**, addressing disparities in **renewable capacities**.
- **Enhance Data Transparency and Reporting Rigor:** Uniform, reliable data underpin accountability.
  - Nations like **Peru and Nepal** have integrated climate reporting with development indicators using **digital platforms**.
  - India should adopt **IPCC-compliant methodologies**, apply **AI and satellite monitoring**, and enable **open data access** to build domestic trust and international credibility, facilitating **dynamic policy revision**.
- **Ensure a Just Transition with Social Protection:** Implementing **social safety nets** and **retraining programs** eases the shift from fossil fuels and garners broader buy-in.
  - **Germany's coal region transitions** based on comprehensive **worker reskilling** and **social dialogue** provide examples of successful just transition models.
  - India and others should engage **local communities** proactively to generate **inclusive opportunities** in green sectors and mitigate **social resistance**.

- **Mobilise Corporate and Private Sector Engagement with Accountability:** Stronger **regulatory frameworks** mandating **disclosures** and **carbon pricing**, coupled with incentives for **green innovation**, can strengthen corporate climate responsibility.
  - **Thailand's sustainability-linked bonds** and **Côte d'Ivoire's public-private partnerships** have catalysed private action.
  - India must ensure **corporate net-zero commitments** translate into **real emission reductions** beyond offsets, closing gaps exposed by recent studies.

Conclusion:

Global climate action requires urgent, transformative change to achieve the **1.5°C goal**. As **Ban Ki-moon**, 8th Secretary-General of the United Nations notes, ***we are the first generation that can end poverty but the last that can prevent runaway climate change.*** Strengthening NDC ambition, scaling transparent finance, advancing technology transfer, ensuring just transitions, and improving data accountability are essential. Together, these measures advance SDG 7 (Affordable and Clean Energy), SDG 13 (climate action), and SDG 17(Partnerships for the Goals), fostering equitable climate resilience worldwide.

Rebuilding India'S Foundational Learning Pyramid

This editorial is based on "Bridging India's numeracy gap," which was published in The Hindu on 25/11/2025. The article highlights that India's persistent numeracy gap, despite improvements in literacy under the National Education Policy 2020 and the NIPUN Bharat Mission, demands urgent, multi-pronged interventions that extend beyond early grades to ensure foundational and higher-level math skills essential for academic success, employability, and equitable growth.

Tag: GS Paper-2, Public Policy, Education, Welfare Schemes, Issues Relating to Development

India's **numeracy gap**, despite progress in **literacy** under the National Education Policy 2020 and the NIPUN Bharat Mission, remains a critical educational challenge due to the **cumulative nature of math learning**, **ineffective teaching methods**, and the **disconnect between classroom and real-life skills**, requiring urgent **extension of interventions beyond early grades** to upper primary levels and inclusion of **higher-level numeracy skills** for equitable **academic** and **economic outcomes**.

What is the Current Status of Foundational Literacy and Numeracy (FLN) in India?

- **About: Foundational Literacy and Numeracy (FLN)** in India refers to the essential skills of **reading**, **writing**, and **basic arithmetic** that every child should acquire by the end of **Grade 3** to ensure successful future learning.
  - It forms the **bedrock** of all educational development and lifelong learning, enabling students to confidently engage with more complex subjects and real-world challenges.
- **Key Aspects of FLN:**
  - **Foundational Literacy** involves not just the ability to read and write at a basic level but also the **comprehension** of simple texts, enabling children to use reading and writing for everyday purposes.
  - **Foundational Numeracy** covers basic **number sense**, the ability to perform simple **arithmetic operations** like addition, subtraction, multiplication, and division, and understanding fundamental mathematical concepts such as **place value** and **fractions**.
  - FLN emphasizes **learning outcomes** rather than inputs, prioritizing whether students truly acquire these critical skills regardless of schooling duration or syllabus coverage.
  - Instruction aligned to children's actual **learning levels**, **continuous assessment**, and **remedial support** are pivotal components.

- **Relevance of FLN :**
  - **Critical for Academic Progression:** Students without strong foundational skills struggle to grasp advanced topics in later grades, causing poor performance and high dropout rates.
  - **Drives Equitable Education**: Early skill acquisition narrows disparities linked to **socioeconomic status**, **geography**, and **language barriers**, fostering inclusion.
  - **Underpins Economic Empowerment**: Literacy and numeracy skills improve **employability** and enable individuals to participate fully in economic and social life.
    - The **NIPUN Bharat Mission** (2021) reflects national commitment, aiming to achieve **universal FLN** by 2026-27.
- **Current Status:**
  - The ASER 2024 report found that only **20.5%** of Grade 3 children can read a Grade 2-level text, and only **25.9%** can perform simple subtraction.
  - The **ASER 2024 report** shows that while **48.7% of Class 5 students can read fluently**, only **30.7% can solve a basic division problem**, reflecting an **18 percentage point gap**. No **State reports higher numeracy than literacy outcomes**.
  - The **Parakh Rashtriya Survekshan 2024** highlights successful state-level interventions extending FLN focus to middle grades, improving numeracy outcomes (e.g., **Dadra and Nagar Haveli**).
  - Pedagogical shifts toward **activity-based**, **level-appropriate teaching** are being implemented but require greater scale and integration.

What are the Key Challenges Affecting the Progress of Foundational Literacy and Numeracy (FLN) in India?

- **Widespread Learning Deficits Despite Near-Universal Enrollment:** India boasts over **95% gross enrollment** in elementary education. However, enrollment has not translated into learning gains,
  - According to the ASER 2024 report**,** more than half of Grade 3 students cannot read Grade 2-level text fluently or perform simple subtraction.
  - This stark gap reveals a deep **"learning crisis"** where children are physically in school but failing to acquire basic skills essential for further learning.
  - For example, only about **20.5%** of Grade 3 children achieve basic reading fluency, indicating urgent need for **pedagogical reforms** and learning support (ASER 2022)

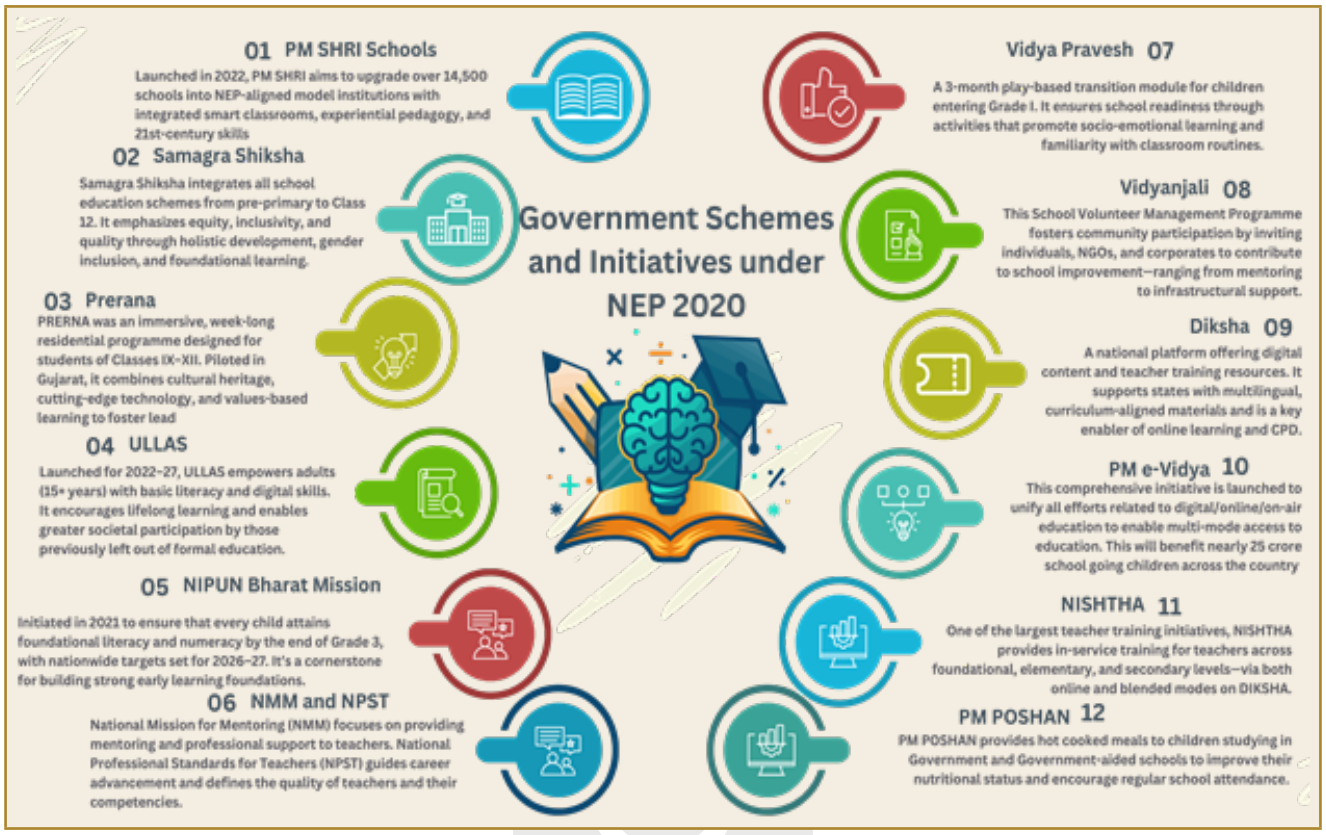
- **Pronounced Numeracy-Literacy Divide:** While nearly half (**48.7%**) of Class 5 students read fluently, only **30.7%** can solve basic division problems, reflecting a significant **18 percentage-point gap (ASER 2024)**.
  - No State reports higher numeracy than literacy, highlighting deficiencies in teaching and learning math concepts.
  - This gap implies many children can decode text but struggle with **numerical reasoning**, critical for **cognitive development**, academic success, and life skills.
  - It underscores the need for **numeracy-targeted interventions** and curriculum adjustments incorporating **FLN+ skills** like fractions and decimals.
- **Hierarchical, Cumulative Nature of Mathematics Learning:** Math skills build sequentially—missing foundational concepts such as **place value** limits access to addition, decimals, and higher math.
  - This leads to **compounding learning gaps**, fostering **math anxiety** and disengagement.
  - The problem intensifies over time, with many adolescents failing key subjects like math and science in **board exams**, or dropping out early.
  - For instance, a study notes that about **70% of Class 5** students struggle with basic division, obstructing progression to higher skills and opportunities.
- **Limited Expansion of FLN Interventions Beyond Early Primary Grades:** Current FLN programs like the **NIPUN Bharat Mission** primarily target Grades 1-3, but evidence calls for expansion through Grade 8.
  - Middle-grade interventions in regions like **Dadra and Nagar Haveli** demonstrated sharp improvements in learning outcomes (**Parakh Rashtriya Survekshan 2024**).
  - Without extending **FLN+** coverage, many children lose crucial remediation years post-primary education, perpetuating skill deficits affecting lifetime employability and economic participation.
- **Socio-Economic and Language Barriers Compound Learning Challenges:** Children from impoverished households face multiple disadvantages, **malnutrition**, inadequate stimulation, limited books, and harsh learning environments.
  - A critical barrier is **language mismatch** between home language and school medium, which hampers comprehension and engagement.
  - These inequities deeply impact **FLN acquisition**, perpetuating educational disparities and social inequality.
  - For example, **stunting affects 35.5%** of Indian children, linking poor nutrition with **cognitive deficits** and lower school readiness.
- **Inadequate School Infrastructure and Teaching Resources:** Many schools, particularly in rural areas, lack basic infrastructure like **toilets**, **safe drinking water**, learning materials, and remedial programs.
  - High **pupil-teacher ratios** and **untrained teachers** impede individualized, level-appropriate instruction essential for FLN.
  - Without child-friendly environments and adequate support, students struggle to engage and progress.
  - Research highlights that improving **school infrastructure** and **teacher training** is fundamental for effective FLN delivery.
- **Covid-19 Pandemic-Induced Learning Loss and Digital Divide:** COVID-19 disrupted schooling for months, forcing remote learning. However, lack of **digital access** and resources disproportionately affected vulnerable children, worsening pre-existing learning gaps.
  - The World Bank warns that global learning losses from the pandemic may reverse decades of progress.

- In India, many children missed foundational years of schooling, compounding challenges in literacy and numeracy acquisition, with long-term repercussions on **educational equity** and **workforce readiness**.

- **Disconnect Between Classroom Learning and Real-Life Application:** Studies, such as those by the **Abdul Latif Jameel Poverty Action Lab**, reveal students proficient in classroom assessments often struggle with **practical application**, while children engaged in real-life economic activities lack formal numeracy skills.
  - This disconnect restricts **functional literacy and numeracy**, limiting employability and life skills.
  - Embedding **real-world problem-solving** in pedagogy could bridge this gap, making FLN more applicable and engaging.
- **Rigid Pedagogical Approaches and Assessment Systems:** Traditional, syllabus-centric teaching often advances without consolidating foundational understanding.
  - **Remedial instruction**, **activity-based**, and **level-matched pedagogy** remain fragmented and underutilized. Current assessments emphasize **rote learning** rather than conceptual clarity and application.
  - According to practitioners like **Pratham's Teaching at the Right Level (TaRL)**, personalized, competency-driven instruction significantly improves FLN but requires systemic adoption and **policy support**.

What are the Major Schemes Related to the Primary Education Sector in India?

- **Samagra Shiksha Abhiyan:** An integrated scheme covering pre-primary to senior secondary education, focusing on **universal access**, **infrastructure development**, **quality**, **equity**, and **digital learning**.
- **NIPUN Bharat Mission:** A national initiative aiming to ensure universal **foundational literacy and numeracy (FLN)** for all children by the end of Grade 3 by 2026-27, implementing **play-based** and **multilingual pedagogies**.
- **PM SHRI Schools (Pradhan Mantri Schools for Rising India):** A scheme to transform over 14,500 schools into **model NEP-aligned institutions** with enhanced **infrastructure**, **technology integration**, and **value-based education**.
- **PM POSHAN (Mid-Day Meal Scheme):** Provides **nutritious meals** to over 11 crore children in government and aided schools, improving **enrollment**, **retention**, and **learning effectiveness**.
- **Sarva Shiksha Abhiyan (SSA):** A flagship program to **universalize elementary education** with a focus on **enrollment**, **retention**, **infrastructure**, and **inclusive education** for marginalized groups.
- **Beti Bachao Beti Padhao:** Promotes the **education of girls** and **gender equity** in schools, with special emphasis on **enrollment** and **retention of girls**.
- **Kasturba Gandhi Balika Vidyalaya (KGBV): Residential schools** for girls from **disadvantaged communities** to improve **access** and **quality of education**.
- **Right to Education (RTE) Act:** Legal provision guaranteeing **free and compulsory education** for children aged 6–14 years, ensuring **access** and **learning rights**.
- **National Means-cum-Merit Scholarship Scheme:** Provides **scholarships** to meritorious students from **economically weaker sections** to encourage **continued education** beyond elementary levels.



What Policy Measures are Necessary for India to Address the Foundational Literacy and Numeracy Gaps Effectively?

- **Scale and Tailor the NIPUN Bharat Mission with Real-Time Monitoring:** India must accelerate scaling **NIPUN Bharat**, aimed at universal **FLN** by **2026-27**, with customized **state-level action plans** reflecting linguistic and socio-economic diversity.
  - Parallelly, employ international tools like the **Early Grade Reading Assessment (EGRA)** and **Early Grade Mathematics Assessment (EGMA)** frameworks, used worldwide, for **real-time diagnostics** to identify learning gaps and guide intervention precisely.
  - These assessments enable **iterative curriculum adjustment**, a best practice recommended by **UNESCO** and **UNICEF**.
- **Extend FLN Interventions Beyond Early Primary Grades:** Based on **ASER** data revealing persistent **numeracy deficits** in **Grade 5** and beyond, India should expand remedial **FLN+ programs** to at least **Grade 8**, ensuring mastery of advanced skills such as **fractions** and **percentages**.
  - Countries like **Finland** and **Singapore** emphasize continuous skill build-up integrated over years, not isolated early interventions, underscoring the importance of **longitudinal learning support**.
- **Invest Robustly in Teacher Training and Support:** Global evidence highlights **teacher quality** as pivotal for FLN success.
  - India should institutionalize **continuous professional development** focusing on **child-centered**, **activity-based pedagogy** and **multilingual education**, akin to **Canada** and **New Zealand's** teacher mentoring models.
  - Training should include use of **digital tools** to personalize learning and enhance engagement, as demonstrated by **Australia's** blended learning approaches.

- **Implement Mother Tongue Instruction and Multilingual Pedagogy:** Empirical studies affirm early education in **mother tongue** facilitates cognitive development and retention.
  - India's alignment with this **NEP 2020** directive can draw inspiration from countries like **South Africa** and **Uganda** that deploy **Multilingual Education (MLE)** models effectively for marginalized communities, improving **literacy outcomes** and reducing **dropouts**.
- **Embed Experiential and Real-Life Learning Approaches:** India should mainstream **experiential learning** methodologies from global practices such as **Finland's exploratory learning** and **Japan's "learning by doing."**
  - Incorporating **peer-to-peer learning**, **storytelling**, and **real-world problem solving** increases relevance, motivation, and application for foundational skills, as per **UNESCO guidelines**.
- **Strengthen Early Childhood Education and School Readiness:** NEP's emphasis on **ages 3-6** aligns with neuroscience insights underscoring early **brain development**.
  - India must scale quality **Anganwadi** and **preschool programs** embedding play-based, socio-emotional and foundational skill development.
  - **Brazil's Criança Feliz** program exemplifies coordinated **community** and **home-based early learning** interventions that boost **school readiness**.
- **Address Socio-Economic Barriers through Integrated Support Systems:** India should converge **nutrition** (**Mid-Day Meal Scheme**), **health**, and **education** policies to mitigate adverse socio-economic impacts on learning.
  - International cross-sectoral models, such as **Mexico's Oportunidades** conditional cash transfer program, show gains in **school attendance** and **performance** by linking social welfare with education.
  - Strengthened **community engagement** and **parental education** are vital to sustain learning outside classrooms.

Conclusion:

As Nelson Mandela said, "Education is the most powerful weapon which you can use to change the world." To fulfill this vision, India must strengthen **state-specific FLN plans**, expand interventions **beyond Grade 3**, enhance **teacher training**, promote **mother tongue instruction**, and integrate **experiential learning**. Sustained investments in **early childhood education** and **socio-economic support systems** will ensure **inclusive, equitable, and quality foundational learning**—paving the way for a truly developed and literate India.

Building A Resilient R&D Ecosystem in India

This editorial is based on "Bringing back Indian-origin faculty will need changes in policy, culture," *which was published in The Indian Express on 27/11/2025. The article discusses a new Indian government scheme aimed at attracting established Indian-origin faculty and researchers abroad, particularly in STEM fields, by offering substantial set-up grants and institutional support to create a conducive and autonomous research environment, while emphasising the need for deeper policy and cultural reforms beyond financial incentives to reverse brain drain and strengthen India's research ecosystem effectively.*

Tag: GS Paper 3, Achievements of Indians in Science & Technology, Indigenisation of Technology GS Paper-2, Public Policy, Education, Welfare Schemes, Issues Relating to Development

Amid US academic uncertainties under President Trump, India's government has launched a **scheme** offering **substantial set-up grants** and **institutional support** to attract **Indian-origin STEM faculty** back from abroad, focusing on **priority sectors** like **AI**, **biotech**, and **advanced materials** to reverse **brain drain** and boost **R&D capacity** in **IITs** and national labs. However, success hinges on addressing key hurdles such as **salary gaps**,

bureaucratic delays, **tenure insecurity**, **family relocation challenges**, **uncertain IP rights**, and the need for a **cultural shift** toward **academic freedom**, **merit-based ecosystems**, and **global collaboration**.

What Recent Government Efforts Aim to Attract and Retain Indian-origin Talent and Reverse Brain Drain?

- **Star Faculty Repatriation Scheme:** The Indian government is developing this flagship program to attract top Indian-origin **"star faculty"** and researchers from abroad, particularly the **US**, by offering substantial **one-time set-up grants** for **labs**, **research teams**, and positions in premier institutions like **IITs** and **national labs** under **DST/ DBT**.
  - It emphasizes a **"red-carpet ecosystem"** with **streamlined bureaucracy**, **research autonomy**, **family support**, and focus on **12–14 priority STEM areas** to reverse **brain drain**.
  - This requires reformed **procurement**, **HR**, and **IP policies**, as past efforts like the **VAJRA Fellowship** yielded only limited short-term visits.
- **Prime Minister's Research Fellowship (PMRF):** PMRF addresses brain drain by incentivizing **top domestic PhD students** with **competitive fellowships** to retain talent within India's universities.
  - The rationale is that building a **homegrown talent pipeline** reduces outflow.
  - Its success lies in **meritocratic selection** and **robust funding**, though challenges persist in expanding **quality PhD education** nationwide.
- **Ramanujan Fellowship (DST):** The **Ramanujan Fellowship**, administered by the Department of Science & Technology (DST), seeks to **attract outstanding scientists and engineers of Indian origin working abroad** to pursue independent research in India.
  - It offers a **competitive monthly fellowship**, research support, and the freedom to apply for additional extramural grants.
  - Importantly, it enables the awardee to join any Indian academic or research institution of their choice, ensuring flexibility and autonomy.
  - The fellowship encourages mid-career researchers with internationally recognised work to return and lead advanced research groups, thereby strengthening India's scientific talent pool.
- **INSPIRE Faculty Award (AORC):** The **INSPIRE Faculty Award** under the "Assured Opportunity for Research Careers (AORC)" scheme provides a launchpad for **early-career researchers**, including post-doctoral scholars with high academic merit.
  - Awardees receive **funding equivalent to entry-level Assistant Professor positions**, along with substantial research grants to establish independent labs.
  - This scheme bridges the crucial "early-career gap" where many young scientists leave India due to a lack of stable opportunities.
  - By offering financial security, recognition, and institutional affiliation, INSPIRE helps prevent brain drain and builds a domestic pipeline of high-quality faculty.
- **Ramalingaswamy Re-entry Fellowship (DBT):** The **Ramalingaswamy Re-entry Fellowship**, implemented by the Department of Biotechnology (DBT), targets Indian scientists working overseas who wish to return to India for long-term research careers.
  - The fellowship offers an attractive **consolidated monthly salary, House Rent Allowance (HRA), and an annual contingency/research grant**.
  - Beyond funding, host institutes often provide additional start-up support, enabling fellows to establish research groups quickly.
  - The program has been particularly successful in fields like biotechnology, biomedical sciences, and molecular biology, contributing to significant reverse migration of skilled researchers into premier DBT-funded labs and universities.

- **CSIR "STIO / Outstanding Scientists (Indian Origin)" Scheme:** The **Council of Scientific & Industrial Research (CSIR)** operates the **STIO (Scientists and Technologists of Indian Origin)** and **Outstanding Scientists** programs to attract globally renowned Indian-origin experts to CSIR laboratories.
  - These scientists are offered positions to **initiate or strengthen frontier research areas**, mentor young researchers, and forge international collaborations.
  - The program plays a pivotal role in bringing **cutting-edge expertise**, global best practices, and technology-driven leadership into India's public research institutions.
- **Biotechnology and Research Cluster Expansion (DBT) :** The Department of Biotechnology (DBT) has undertaken major initiatives to expand India's **Biotechnology Research Clusters** in regions such as **NCR (Faridabad), Mohali, and Bengaluru**.
  - These clusters host state-of-the-art laboratories, translational research centers, biotech incubators, and partnerships with industry.
  - Improved infrastructure—such as high-end instrumentation facilities, advanced bio-safety labs, and interdisciplinary research platforms—creates an attractive environment for returning scientists.
- **VAIBHAV Fellowship Program:** VAIBHAV bridges **diaspora scientists** and domestic researchers through **short-term visits** and collaborations, fostering **brain circulation**.
  - It supports **knowledge transfer**, but its limitation is that it doesn't ensure **permanent return**, highlighting the need for **long-term incentives** alongside intermittent engagements.
- **Startup India and Digital India:** By supporting returnee entrepreneurs with **funds**, **infrastructure**, and **simplified regulations**, these initiatives leverage **entrepreneurial talent** to strengthen innovation ecosystems.
  - Encouraging returnees to commercialise **cutting-edge technologies** generates jobs, builds **tech clusters**, and aligns financial and professional incentives to reverse **brain drain**.
- **IndiaAI Startups Global Initiative and IndiaAI Mission:** India's push for **inclusive AI research hubs**, **global partnerships**, and **ethical frameworks** attracts top AI experts.
  - This **sectoral specialisation** counters global talent competition and builds an **AI-driven innovation ecosystem** aligned with national priorities.

Note:

- **Brain Drain:** Refers to the large-scale migration of **highly skilled professionals** to foreign countries in search of **better salaries**, **research opportunities**, **living standards**, and **career growth**, leading to a **weakened domestic talent pool** and slower innovation.
- **Reverse Brain Drain:** Denotes the return of skilled professionals due to **improved research ecosystems**, **competitive incentives**, **family considerations**, and **proactive national policies**, helping strengthen **domestic capacity**, **innovation**, and **knowledge-based growth**.

What are the Key Challenges Behind India's Persistent Brain Drain Issue?

- **Limited Domestic Employment Opportunities:** India faces a significant **jobs crisis**, with the **employment-to-population ratio** at only about **52.5%**, according to **PLFS October 2025** data.
  - Many skilled graduates encounter **uncertain job markets** and **limited career growth**, pushing them to explore stable and rewarding employment overseas.
    - From **2003 to 2013**, the number of **scientists and engineers** residing in the **U.S.** rose from **21.6 million** to **29 million**.
- **Salary and Financial Incentive Gaps:** Salary **disparities** remain stark. Indian **engineering** and **data professionals** saw a significant **pay drop** to **$22,000** in **2025**, a stark contrast to the **US's $150,000**.

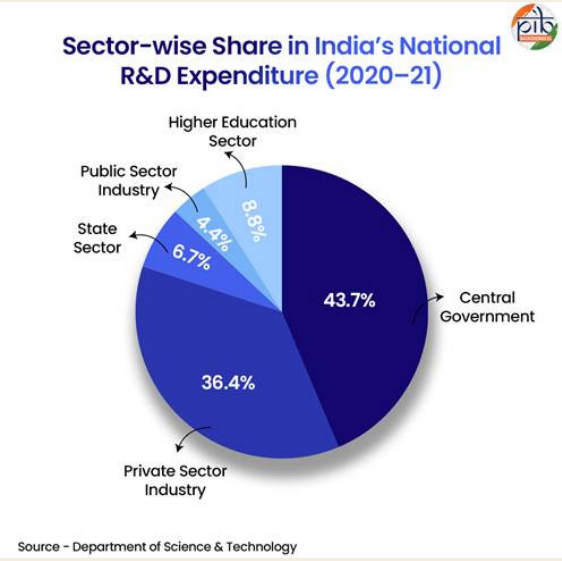
- Such financial gaps, combined with better **benefits** and **job security** abroad, form strong **economic incentives** for migration.
- The US **H-1B visa program** is especially attractive, with more than **70% of H-1B holders** originating from India, facilitating access to **high-paying jobs** and global **career networks**.

- **Inadequate Research and Development Ecosystem:** India's **gross expenditure on R&D (GERD)** stands at **0.65% of GDP**, which is lower than the **global average of 1.79%**.
  - This **underfunding**, coupled with **bureaucratic delays**, insufficient **laboratory infrastructure**, and weak **IP protection**, discourages **innovation-driven professionals**.
  - Many Indian scientists seek supportive **research environments** abroad, where strong **government and private sector investments** foster **cutting-edge R&D**, making India's ecosystem less competitive.
- **Lack of Academic Freedom and Institutional Autonomy:** Excessive **administrative hurdles**, limited freedom to pursue **independent research**, and **political interference** characterize many Indian academic institutions.
  - This contrasts sharply with the **autonomy** and **merit-based advancement** in Western universities, prompting scholars to seek freer **intellectual climates**.
    - The recent **Academic Freedom Index (AFI)** categorizes India's academic status as **"completely restricted"**.
  - Academic leaders highlighted the **cumbersome administrative processes** in India as a major deterrent.
- **Family and Socio-Economic Challenges:** Returnee scientists and professionals face concerns over **spousal employment**, **quality education**, and overall **quality of life**—factors that overseas countries often address through comprehensive **family support policies**.
  - This gap discourages many from returning or motivates migration, despite the emotional pull of "home."
    - Large **Indian diaspora communities** abroad offer strong **social and professional networks** that ease **integration** and attract further migration.
  - **Structural socioeconomic inequalities, including** wide **disparities in education quality**, limited **access**, and weak **upward mobility,** deter many talented Indians from realising their full potential at home.
  - The frustration feeds into a cycle where the best-trained Indians seek **meritocratic environments** overseas that promise **fairness** and **inclusivity**.

What are the Key Institutions and Policies in India that Promote Research and Innovation?

- **Institutional Framework :**
  - **Anusandhan National Research Foundation (ANRF):** Established in **2023** and operational since **February 2024**, ANRF mobilizes **₹50,000 crore (2023–28)** from **government and non-government sources** to provide **strategic direction** for **research**, linking **academia-industry** for **high-impact projects**.
  - **Atal Innovation Mission (AIM) 2.0:** Extended to **2028** with **₹2,750 crore** under **NITI Aayog**, AIM fosters **innovation** through **Atal Tinkering Labs** in schools and **Atal Incubation Centres** to nurture **entrepreneurship**.
  - **IN-SPACe:** Created under the **Indian Space Policy 2023**, IN-SPACe **regulates** and **promotes private sector participation** in **space research** and **innovation**.
- **Policy Framework:**
  - **Research Development and Innovation (RDI) Scheme:** Launched in **November 2025**, with **₹1 lakh crore corpus**, it finances **private-led R&D** in **sunrise sectors** via **low/zero-interest loans** to boost **self-reliance**.
  - **National Geospatial Policy 2022:** Enables **open access** to **geospatial data** and aims for **full national mapping by 2030** to support **innovation** in **location-based technologies**.

- **BioE3 Policy 2024:** Promotes **biomanufacturing hubs** to address **climate, health**, and **waste challenges** through **high-performance biomanufacturing**.
- **IndiaAI Mission:** Allocated **₹10,371.92 crore**, it scales **computing infrastructure** to **38,000 GPUs** for advancing **AI research** and **applications**.
- **National Quantum Mission (NQM):** Approved in **2023** with **₹6,003.65 crore (2023–31)**, it develops **quantum computers, secure communication**, and **materials** via **dedicated hubs**.
- **National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS):** With **₹3,660 crore**, it establishes **AI/robotics hubs** to integrate **cyber-physical technologies** across sectors.
- **National Supercomputing Mission:** Builds **high-performance computing infrastructure** to support **advanced computational research** nationwide.
- **India Semiconductor Mission:** Offers **₹76,000 crore incentives**, with **10 projects approved** to create a **domestic semiconductor ecosystem**.
- **Deep Ocean Mission:** Funded at **₹4,077 crore**, it advances **ocean technology, resources**, and **deep-sea exploration capabilities**.



How Can India Effectively Reverse the Persistent Brain Drain?

- **Elevate R&D Spending to Global Benchmarks:** Government must urgently raise **R&D expenditure** from the current **0.65% of GDP** to **2% by 2030**, aligning with **NITI Aayog's 2021 Science, Technology & Innovation (STI) Policy** and **ANRF's ₹50,000 crore five-year corpus** for **high-impact grants**.
  - This mirrors **South Korea's success**, where **4.9% GDP investment** retained a large proportion of **STEM PhDs domestically** and boosted **patent filings** through sustained **lab modernization** and competitive **researcher support**.
- **Implement Nationwide Ease of Doing Research Reforms:** Roll out a **"red carpet mandate"** via **single-window digital portals** for all approvals, **procurement up to ₹10 crore** without Finance Ministry clearance, and **visa fast-tracking**, as recommended by **DST's 2025 Ease of Research Framework**.
  - Emulate **Singapore's A*STAR Agency model**, which **slashed bureaucratic delays** via **automated systems**, retaining **overseas-recruited talent** and boosting **research output** through **researcher-centric administration**.
- **Mandate Tenure-Track Pathways with Career Security Guarantees:** Legislate explicit **5-year tenure conversion pathways** in **IITs, IISc, and national labs**, replacing **ad-hoc fellowships**.
  - Adopt the **US National Science Foundation's (NSF) CAREER program**, which provides **long-term grants** and **clear promotion pathways** for mid-career researchers, fostering **career stability, institutional loyalty**, and **higher research productivity**.
- **Reform IP Ownership for Equitable Commercialisation:** Enact laws granting **researchers 50-70% IP ownership** with **streamlined licensing**, integrated into **RDI Scheme's ₹1 lakh crore low-interest fund**, following **DST committee directives**.

- Replicate **Israel's Yozma Initiative**, where strong **IP reforms** attracted **venture capital**, encouraged the **return of diaspora scientists**, and significantly boosted **startup creation** through **university spin-offs** and innovation-led enterprises.

- **Launch Holistic Family Support Packages:** Create a dedicated **Returnee Talent Portal** offering **spousal employment support**, **subsidised housing**, and **priority access to quality schooling**, addressing family-related barriers that often hinder the return and retention of skilled researchers.
  - May follow **Canada's Global Talent Stream visas**, which encourage the return of skilled researchers by offering **family reunification support**, **relocation assistance**, and **education-related benefits**, making long-term relocation more attractive and sustainable.
- **Forge Strong Academia-Industry Linkages through Innovation Clusters:** Scale **AIM 2.0 Atal Incubation Centres** with **joint R&D funding** and **shared IP frameworks** across multiple regions to strengthen **academia-industry collaboration** and foster a robust **innovation ecosystem**
  - Model **China's Thousand Talents Plan**, which built **large-scale university–industry clusters**, attracted highly skilled experts back to the country, strengthened long-term retention through major collaborative projects, and significantly **expanded high-tech employment and innovation capacity**.
- **Institutionalize Academic Freedom via Cultural and Legal Shifts:** Pass **NEP 2020-aligned statutes** ensuring **institutional insulation** from **political interference**, **merit-based promotions**, and **interdisciplinary hiring**, countering surveys showing **major faculty dissatisfaction** with hierarchies.
  - Benchmark the **EU's Council Recommendation** and **European Research Council (ERC) grants**, which strengthen retention of mid-career researchers through **portable funding**, **academic freedom**, and **anti-bias mobility frameworks**, promoting a globally competitive and inclusive research ecosystem.

Conclusion:

India's efforts to **reverse brain drain** are reflected in its rise to **38th rank in the Global Innovation Index**, highlighting progress in building a robust **R&D ecosystem**. As economist **Prof. Michael Porter** noted, **"Innovation is the central issue in economic prosperity."** To retain and attract skilled talent, India must **enhance research opportunities**, **streamline academic processes**, **strengthen academia-industry collaboration**, and ensure **academic freedom**, thereby sustaining talent, driving **R&D-led innovation**, and securing leadership in the global knowledge economy.

India'S Battle Against Antimicrobial Resistance

This editorial is based on "Strengthening the Frontline Against AMR: Building Progress Through Collective Commitment" which was published in The Hindustan Times on 24/11/2025. The article brings into picture the rising threat of AMR, which now spans humans, animals, and the environment, endangering modern medicine and food systems. It highlights India's policy steps, including Kerala's PROUD/AMRITH initiatives, and stresses that only a coordinated One Health approach can curb this crisis.

Tag: GS Paper - 2, Government Policies & Interventions, GS Paper - 3, Health

Antimicrobial resistance (AMR) has evolved into a critical development challenge that threatens to undo decades of progress in **health, agriculture, and** poverty reduction. The problem extends far beyond hospitals, resistant microbes contaminate soil, water, and food chains, endangering everything from routine medical procedures to livestock production. India has responded with strong policy measures, including **bans on certain antibiotics in food animals and innovative state programs like Kerala's PROUD and AMRITH initiatives,** which have demonstrated both health and economic benefits. Addressing this crisis requires coordinated action across human, animal, and environmental health sectors under the One Health framework**.** The stakes are clear: without effective antimicrobials, the foundation of modern medicine and sustainable development faces unprecedented risk.

What is Antimicrobial Resistance?

- **About: Antimicrobial Resistance (AMR)** is often termed the **"Silent Pandemic."** It occurs when microorganisms (**bacteria, viruses, fungi, and parasites**) evolve and stop responding to medicines **(antimicrobials)** that were once effective in treating them.
  - The result is the emergence of **"Superbugs"**- pathogens that are resistant to multiple drugs, making standard treatments ineffective, persistent infections more likely, and increasing the risk of spread to others.
- **Core Mechanism:** AMR is a natural evolutionary process, but human activity has accelerated it dangerously. Microbes develop resistance through four main mechanisms:
  - **Limiting Uptake:** The microbe changes its cell wall to prevent the drug from entering.
  - **Target Modification:** The microbe alters the specific protein or molecule the drug is supposed to attack, so the drug can no longer bind to it.
  - **Efflux Pumps:** The microbe develops biological "pumps" to physically spit the drug out of the cell before it can do damage.
  - **Drug Inactivation:** The microbe produces enzymes (like *beta-lactamases*) that chemically destroy or neutralize the drug.

Think of it like this

Twenty years ago, a simple mosquito coil or a basic mat was enough to kill them or chase them away. Today, you can run a liquid vaporizer on "High/Turbo" mode, and the mosquitoes will still fly around it.

Why? The mosquitoes didn't change species. The weak ones died years ago. The ones that survived the coil "learned" how to tolerate the poison. They bred and created "super-mosquitoes" that are immune to the old weapons.

Antimicrobial Resistance is exactly this, but with bacteria inside your body. When you misuse antibiotics, you kill the weak bacteria, but you teach the strong ones how to survive.

What Factors are Fueling the Growing AMR Crisis in India?

- **Rampant Clinical Misuse & "Watch" Category Abuse:** Doctors often prescribe broad-spectrum antibiotics for simple viral infections due to a lack of rapid diagnostics, while lax enforcement of Schedule H1 allows pharmacies to sell high-end drugs without prescriptions.
  - This **"pill-popping" culture** accelerates resistance by exposing bacteria to drugs unnecessarily, forcing them to evolve survival mechanisms rapidly.
    - A striking example of India's growing pill-popping culture is the widespread use of **Dolo-650** after the pandemic—one doctor even joked that Indians take it like Cadbury Gems.
    - This trend is worsened by the easy over-the-counter availability of antibiotics, leading people to self-medicate without understanding the risks.
  - About **59% of total antibiotic consumption in the country in 2022 was from the "Watch" group** with 8 in 10 patients entering a hospital carrying drug-resistant bacteria.
- **Growth Promoter Epidemic in Livestock:** The **poultry and aquaculture industries** prioritizing profit over public health routinely use critical antibiotics like **Colistin** not to treat sickness, but to fatten animals faster.
  - This creates a massive **"reservoir of resistance"** in the food chain, where drug-resistant bacteria transfer directly from meat/fish to the human gut.
  - India is the **4th largest consumer** of animal antibiotics globally, with usage projected to **rise 82% by 2030**; recent studies found **100% resistance** to Ampicillin in shrimp samples collected from retail markets in Kerala.
- **Pharmaceutical Pollution-The "Hyderabad Model":** As the "Pharmacy of the World," India suffers from manufacturing units dumping untreated antibiotic residues into local water bodies, creating **"evolutionary pressure cookers."**

- In these antibiotic-rich rivers, bacteria are forced to mutate into superbugs to survive, which then seep into groundwater and community water supplies.
- Recent Environmental studies found antibiotic concentrations in Hyderabad's **Musi River** were **1,000 times higher** than safe limits.

- **Proliferation of Irrational Fixed-Dose Combinations (FDCs):** The Indian market is flooded with unscientific **"cocktail drugs"** that combine multiple antibiotics or antibiotics with vitamins, which exposes pathogens to sub-therapeutic doses and accelerates resistance.
  - The regulatory crackdown is ongoing, but these irrational formulations continue to drive resistance by offering **"shotgun therapy"** instead of targeted treatment.
  - In **August 2024**, the Government banned **156 FDCs** (including antibiotic cocktails) citing **"no therapeutic justification".**
- **The "Scavenger" Spread via Poor Sanitation:** Inadequate sewage treatment allows resistant **"superbugs" like NDM-1 (New Delhi Metallo-beta-lactamase)** to escape hospitals and thrive in public water systems.
  - According to a recent epidemiological study, urban wastewater frequently carries high loads of antibiotic-resistant **E. coli, Klebsiella and Pseudomonas.**
    - When sewage networks are flawed or untreated, these bacteria can re-enter natural water bodies, soils and even toilets, turning common sanitation infrastructure into bridges for superbug transmission.
- **Surveillance Blind Spots & Diagnostic Deficits:** India's AMR data is heavily skewed toward **tertiary ICUs, missing the "silent pandemic" in rural primary care** where doctors prescribe empirically due to a lack of labs.
  - Without affordable rapid diagnostic kits, healthcare providers cannot distinguish between bacterial and viral infections, leading to massive unnecessary prescriptions.
  - For instance, **NCDC's NARS-Net submissions rely mainly on public sector medical colleges and sentinel hospital labs,** under-representing small private clinics and rural facilities, which together handle a huge share of everyday infections.

What are the Key Threats Posed by Antimicrobial Resistance?

- **Economic Threats:**
  - **Trade & Export Losses (The "Shrimp & Poultry" Crisis):**
    - **Seafood Exports:** India is a leading **global exporter of shrimp.** However, high antibiotic residues (traces of drugs used to treat aquatic disease) have triggered frequent rejections by the EU and USA.
- For instance, the **US FDA has refused entry to multiple Indian shrimp lines due to banned antibiotics** like nitrofurans and chloramphenicol**.**
    - **Poultry & Livestock:** As **global markets (specifically the EU) enforce strict "antibiotic-free" regulations**, India's poultry sector faces the risk of being locked out of high-value supply chains.
- The rampant use of antibiotics as "growth promoters" acts as a significant compliance hurdle.
  - **Healthcare Cost Explosion:**
    - **Treatment Costs:** Treating drug-resistant infections is exponentially more expensive.
- It necessitates **"last-resort" antibiotics (like *Colistin* or *Meropenem*)**, prolonged hospitalization, and expensive isolation protocols.
    - **Financial Toxicity:** With **39.4%** of India's Total Health Expenditure being **Out-of-Pocket (OOPE)** according to the ***National Health Accounts Estimates 2021-22***, AMR pushes families into poverty.
- A single episode of resistant sepsis can wipe out a low-income family's life savings.
  - **Loss of Productivity & GDP:**
    - **Workforce Impact:** AMR disproportionately affects the working-age population. Prolonged illness leads to absenteeism and wage loss.

- The **World Bank** estimates that AMR could cause a global GDP shortfall of up to **3.8% by 2050**; for a high-burden country like India, the impact could be even more severe.
    - **Demographic Dividend Risk:** India's primary economic advantage is its young workforce. If a significant demographic cohort is debilitated by chronic resistant infections **(like MDR-TB), this "dividend" risks turning into a "demographic liability."**
- **Societal & Public Health Threats**
    - **Return to the "Pre-Antibiotic Era":**
        - **Routine Procedures Become Deadly:** Modern medicine relies on antibiotics for prophylactic safety. Without them, standard procedures**, such as C-sections, hip replacements, and chemotherapy**, become life-threatening due to infection risks.
        - **Neonatal Mortality:** India faces a tragic burden where an estimated **50,000+ newborns die annually** from sepsis caused by organisms resistant to first-line antibiotics.
- This directly undermines **national efforts to reduce the Infant Mortality Rate (IMR).**
    - **The Rise of "Superbugs":**
        - **Hospital-Acquired Infections (HAIs):** ICMR reports indicate that **common pathogens (like *E. coli* and *Klebsiella*) in Indian hospitals are increasingly resistant to potent antibiotics.**
            - Carbapenem-resistant organisms are now widespread, leaving doctors with few to no treatment options.
        - **Drug-Resistant TB:** India bears the highest **global burden of Multi-Drug Resistant Tuberculosis (MDR-TB).** This airborne threat creates a vicious cycle of disease and poverty, particularly among the urban poor and slum dwellers.
- **Environmental Threats (The "One Health" Crisis)**
    - **Pharmaceutical Pollution:** While India is the "pharmacy of the world," this manufacturing prowess comes at an environmental cost.
        - Effluents from pharmaceutical hubs (notably in Hyderabad) often contain high concentrations of antibiotics.
        - These contaminate local water bodies, turning them into **"breeding grounds"** for superbugs, which eventually cycle back to humans.
    - **Agricultural Runoff:** Antibiotics used in agriculture seep into the soil and groundwater.
        - This creates a transmission loop where resistant bacteria enter the human food chain through crops and drinking water.

What Major Initiatives has the Indian Government Undertaken to Tackle the AMR Crisis?

- **National Action Plan on AMR 2.0 (2025-29):** A recently launched updated framework focusing on "One Health" surveillance, infection prevention, and antimicrobial stewardship across human and animal sectors.
- **Chennai Declaration:** It is the result of the first ever joint meeting of medical societies in India addressing antibiotic resistance.
- **Delhi Declaration on Antimicrobial Resistance (AMR):** It is an inter-ministerial consensus signed in April 2017 to combat antimicrobial resistance through a holistic "One Health" approach.
- **Red Line Campaign:** A public awareness drive requiring antibiotics to carry a vertical red line on packaging, signalling they must not be sold or consumed without a doctor's prescription.
- **Fixed-Dose Combination (FDC) Ban (2024):** A regulatory crackdown banning 156 irrational "cocktail" drug formulations (many containing antibiotics) that lacked scientific justification and fuelled resistance.
    - Also, the **government has banned the use of colistin in animal feed to curb the rising threat of antimicrobial resistance (AMR).**

- This step aims to prevent the development of resistance to this critical "last-resort" antibiotic in humans.

- **Schedule H1 Implementation:** A legal amendment to the Drugs and Cosmetics Rules that mandates pharmacies to maintain a separate register for antibiotic sales and prevents over-the-counter availability.
- **ICMR's Antimicrobial Resistance Surveillance Network (AMRSN):** Established in 2013, is a system for collecting, analyzing, and reporting data on antimicrobial resistance (AMR) from various tertiary care hospitals across India.

What Measures can be Adopted to Effectively Counter AMR Crises in India?

- **"Hub-and-Spoke Diagnostic Grid:** To tackle the "blind" prescription epidemic especially in rural India, we must operationalize a **Hub-and-Spoke Diagnostic Model**.
  - In this system**, Tertiary Care Centers (Hubs)** with advanced microbiology labs are digitally linked to **Primary Health Centers (Spokes)**.
  - Peripheral health workers merely collect samples and transport them via defined cold-chain logistics to the Hub, receiving digital reports within 24 hours.
  - This eliminates the **need for expensive labs in every village while ensuring that rural doctors prescribe based on *evidence* (antibiograms) rather than *empirical guesswork***, drastically reducing unnecessary antibiotic use.
    - Encourage the use of indigenous, **low-cost rapid diagnostic kits—such as Assam's DOSA project or IITs' Lab-on-a-Chip innovations**—that can distinguish viral from bacterial infections in minutes, helping avoid unnecessary antibiotic use.
- **"Antibiotic Smart Villages" (WASH-First Defense):** Prevention is better than cure; we should launch **"Antibiotic Smart Villages"** that prioritize Water, Sanitation, and Hygiene (WASH) infrastructure to break the chain of infection.
  - By ensuring **100% coverage of potable piped water and sewage treatment** in targeted clusters, we reduce the incidence of waterborne diseases like **Typhoid and Diarrhea.**
  - If fewer people get sick, fewer people need antibiotics, naturally lowering the selection pressure for resistance without needing complex medical interventions.
- **Incentivized "Green Pharma" Procurement:** The government, being the largest buyer of drugs, should enforce a **"Green Procurement Policy."**
  - Pharmaceutical companies that can prove their manufacturing units achieve **"Zero Liquid Discharge" (ZLD)** and treat effluents to remove antibiotic residues should receive preferential weightage in government tenders.
  - This uses market forces **("Pull" incentives)** to make pollution control financially profitable for companies, stopping the release of active pharmaceutical ingredients into India's rivers and soil.
- **"Farm-to-Fork" Antibiotic Traceability:** To secure the food chain, we need a **Blockchain-based Traceability System** for the poultry and aquaculture sectors.
  - Feed manufacturers and hatcheries would be required to log batch details on a decentralized ledger, certifying that their products are free from growth-promoting antibiotics like Colistin.
  - **Consumers could scan a QR code on the final meat/egg product to see its "Antibiotic-Free" journey.**
    - This consumer demand for transparency would economically force producers to abandon the use of antibiotics as cheap growth substitutes.
- **Integrated "One Health" Surveillance Platform:** We must move beyond theoretical collaboration to a **Unified National AMR Dashboard** that legally mandates data integration from human, veterinary, and environmental sectors.

- By using AI to cross-reference data—**for example, correlating a spike in *Colistin* sales in local poultry farms with a rise in drug-resistant gut infections** in the nearby human population district authorities can identify and isolate **"transmission hotspots" immediately,** treating the ecosystem as a single biological unit rather than separate silos.
- **Kerala model successfully implements a strict ban on over-the-counter (OTC) antibiotic sales** through a comprehensive, multi-pronged strategy that combines strict regulatory enforcement, public awareness campaigns, and a multi-sectoral 'One Health' approach.
- **Subsidising animal vaccines** can significantly cut antibiotic misuse; a vaccinated chicken is far less likely to fall sick, reducing the farmer's dependence on routine antibiotic feeding.

Behavioral Change Communication (BCC) Campaigns: Instead of passive awareness posters, we need **Targeted Behavioral Nudges** based on local psychology to break the "pill-popping" habit.

- This involves structured community engagement where trusted **local leaders (religious heads, teachers)** explain that antibiotics are **"precious resources," not "quick fixes."**
- By framing antibiotic preservation as a moral duty to the next generation **(similar to the Swachh Bharat narrative)**, we can shift the societal norm from expecting a prescription for every fever to understanding that **"time and rest" are often the best healers.**

The "Blue Envelope" Protocol: In India, **pharmacists often cut strips and sell just 3 or 4 pills in a generic white paper bag**. To address the risk of loose pill dispensing (where the **original 'Red Line' warning is lost)**, mandate a distinct color-coded envelope exclusively for antibiotics.

- This visual distinction acts as a critical safeguard. The **Blue Envelope does not tell you to *start* taking the drug; it tells you: "If you have started this, do not stop halfway, or you will make the bacteria stronger."**
- By distinguishing these from common painkillers, it ensures patients complete the full course to achieve total bacterial eradication, rather than leaving surviving bacteria to mutate into superbugs.
- Also, another major issue in India is patients saving leftover antibiotics and popping them later for a viral flu.
  - If the pills are in a standard white bag, they look like any other medicine.
  - If they are in a specific **Blue Envelope**, it creates a mental category: *"This is that serious medicine for heavy infections."* It discourages casual use for a common cold later on because the packaging denotes severity.

Conclusion:

AMR is no longer just a medical issue but a multidimensional development threat demanding urgent, systemic action. India's recent policies and state-led innovations show that progress is possible with coordinated efforts. Strengthening surveillance, regulation, and WASH infrastructure under a robust One Health approach is essential. Only sustained, cross-sectoral collaboration can safeguard the future of effective antimicrobials and public health.

G20 At Crossroads- Opportunities to Reclaim Global Leadership

This editorial is based on " Without great powers on board, G20 is adrift ", *which was published in The Indian Express on 28/11/2025. The article argues that the G20, once created to empower rising economies, has lost significance due to major-power disengagement and failure on key global issues, pushing India to shift its focus toward platforms like the Quad and the East Asia Summit.*

Tag: GS Paper 2, International Treaties & Agreements, Important International Institutions, Groupings & Agreements Involving India and/or Affecting India's Interests, Effect of Policies and Politics of Countries on India's Interests

The G20 was formed during the 2008 financial crisis as a vital platform that included both **established and emerging economies, such as** India and China. Recently, at the **Johannesburg 2025 summit**, the **absence of key leaders** such as those from the **US, China, and Russia** has reduced the forum to a gathering of **middle powers**, exposing its **declining influence**. The G20 now struggles to address critical global issues, including **climate finance**, **sovereign debt**, **trade conflicts**, and **migration**. **Geopolitical tensions**, **lack of inclusivity**, and **slowed decision-making** are key challenges that threaten its **future relevance** and **effectiveness**. **Urgent reforms** are needed to restore its role in **global governance**.

What Role Does the G20 Play in the Current Global Governance Landscape?

- **Premier Economic Coordination Forum:** The **G20** has become one of the most influential platforms shaping global governance, representing **85% of global GDP**, **75% of global trade**, and **two-thirds of humanity**.
  - Initially created to coordinate responses to financial crises, it has evolved into a comprehensive forum dealing with economic stability, climate change, sustainable development, digital transformation, and geopolitical tensions.
    - During the **2008 global financial crisis, the G20 collectively injected $5 trillion** in stimulus packages, which prevented a deeper global recession
  - In a fragmented and multipolar world, the G20 provides the necessary space for dialogue among advanced and emerging economies, making it central to solving problems that no country can address alone.
- **Addressing Global Debt and Ensuring Financial Stability:** With **over 60 low-income countries at high risk of debt distress** (World Bank), global debt management has become a major governance concern.
  - The G20's **Common Framework for Debt Treatment** is currently the only structured platform bringing together traditional lenders (Paris Club nations) and new creditors such as China and Gulf countries.
  - By encouraging debt transparency, sustainable repayment plans, and creditor coordination, the G20 prevents defaults that could destabilise entire regions.
  - Similarly, through the **Financial Stability Board (FSB)**, the G20 strengthens global rules on cryptocurrency regulation, shadow banking, and cross-border financial flows.
- **Leading Global Climate Action and Energy Transition:** The G20 is indispensable for global climate progress, as it is responsible for **around 80% of global carbon emissions**.
  - Its leadership, therefore, directly determines whether global climate targets can be met. Recent G20 declarations have committed to **tripling renewable energy capacity by 2030**, increasing climate finance, and advancing just energy transitions.
  - Under India's G20 presidency, initiatives such as the **Green Development Pact**, LiFE (Lifestyle for Environment), and global biofuel alliances set new frameworks for climate action.
  - These commitments influence global negotiations under the UNFCCC and encourage green investments.
- **Reforming Multilateral Institutions:** Reforms of the IMF, World Bank, and UN have become essential as global power shifts towards emerging economies.
  - The G20 is now the leading forum advocating these reforms.

- The World Bank's ongoing plan to mobilise an additional **$100 billion in development finance** is a direct outcome of G20 recommendations.
- India's successful push to include the **African Union as a permanent G20 member** in 2023 reflects a major step toward democratising global decision-making and giving the Global South a stronger voice.

- **Shaping Digital Governance and Technology Standards:** As digital technologies transform economies, the G20 plays a strategic role in setting global standards on AI ethics, cross-border data flows, cyber-security, and digital public infrastructure (DPI).
  - The G20 praised **India's DPI model, based on Aadhaar, UPI, and DigiLocker**, as a replicable, low-cost framework for developing countries, marking a turning point in digital governance.
  - By encouraging interoperable digital platforms, the G20 strengthens financial inclusion and expands access to digital services across continents.
- **Strengthening Global Health Architecture:** The **Covid-19 pandemic** exposed severe weaknesses in global health systems, prompting the G20 to expand its health agenda.
  - The creation of the **Pandemic Fund**, with initial commitments of **$2 billion**, supports early-warning systems, healthcare infrastructure, and rapid-response mechanisms in developing countries.
  - The G20's focus on equitable vaccine distribution, surveillance systems, and resilient supply chains for pharmaceuticals demonstrates its broader shift toward global health security.
- **Ensuring Food, Energy, and Supply Chain Security:** The world is experiencing repeated disruptions due to geopolitical tensions, natural disasters, and conflicts.
  - The G20 works to stabilise supply chains by promoting diversification, resilient logistics, and transparent trade mechanisms.
  - For example, the G20 dialogue on the **Black Sea Grain Initiative** helped safeguard global food supplies for vulnerable regions in Africa and Asia.
  - The announcement of the **India-Middle East-Europe Economic Corridor (IMEC)** in 2023 highlights the G20's role in shaping alternative supply routes to enhance global economic resilience.
- **Advancing Global South Priorities:** The **G20 has increasingly become a voice for developing nations.**
  - Issues such as **climate justice, concessional finance, technology sharing, and development pathways** have received greater attention due to the influence of emerging economies like **India, Brazil, South Africa, and Indonesia.**
  - **India's G20 2023 presidency**—hosting **over 200 meetings in 60 cities**—demonstrated unprecedented inclusivity and highlighted concerns of the Global South on debt, food security, and climate finance.

G20

Founded in 1999 after Asian financial crisis to discuss global economic and financial issues

No permanent secretariat

Members: 19 countries, The European Union (EU) and The African Union

Permanent Guest: Spain

G20 Summit: Takes place annually

2023 Presidency: India (**Theme:** One Earth, One Family, One Future)

Sherpas: The agenda and work are coordinated by them as the representatives of the G20 countries

Troika: The Presidency is supported by the Troika (previous, current and incoming Presidency)

What were the Key Highlights of the 2025 G20 Summit Held in Johannesburg, South Africa?

- **G20 Johannesburg Leaders' Declaration:** Despite the **US boycott**, the summit adopted a **comprehensive declaration** centered on **solidarity**, **equality**, and **sustainability**, reflecting the African philosophy of Ubuntu.
  - It reinforced commitments to **multilateral reforms**, **climate action**, **equitable economic governance**, and **greater Global South representation**.

- Despite major **absences**, the summit produced a joint call for **peace** invoking the **era not of war**, addressed **instability** in **Ukraine**, **Palestine**, **Sudan**, and the **DRC**, and reinforced resistance to **trade isolationism** along with support for **multilateral cooperation**.

- **Climate Finance and Just Energy Transition:** Members pledged to scale up **climate finance**, operationalizing the Paris Agreement–aligned **just transition** pathways and establishing a loss and damage fund for vulnerable nations.
  - Summit welcomed the Mission 300 initiative focused on expanding **clean energy access** by 2030.
- **Debt Sustainability Reforms:** A new **Cost of Capital Commission** has been established to reform **global credit rating frameworks** and address the disproportionate **African risk premium**.
  - Tools such as **debt-for-climate** and **debt-for-development swaps** and improved **creditor coordination** addressed the escalating **Global South debt crisis**.
- **Youth and Gender Empowerment:** The summit adopted the **Nelson Mandela Bay Target** to reduce **youth NEET rates** and committed to boosting **female labor participation**.
  - Women were recognized as **agents of peace**, with calls to remove **structural barriers**.
- **Food Security and Inequality:** The declaration endorsed **Ubuntu-based approaches** to stabilize **food prices**, support **smallholder farmers**, and strengthen **nutrition security**.
  - It highlighted concerns over **market volatility** and the need to reduce **inequality**, especially across the **Global South**.
- **Digital and AI Governance:** Leaders agreed on a **global AI governance framework** emphasizing **safety**, **transparency**, and **human rights**.
  - The summit prioritized bridging the **digital divide**, enhancing **digital skills**, establishing **data governance norms**, and improving **cybersecurity**.

What are Key Policy Proposals from India at the G20 Summit 2025?

- **Continuity from India's 2023 Presidency:** As the previous host, India set a strong agenda under the theme **"Vasudhaiva Kutumbakam" ("One Earth, One Family, One Future")** and ensured that many of its priorities such as **climate action**, **sustainable development**, **digital infrastructure**, and **Global South advocacy** remain central under the next presidencies.
  - The global push for **renewable energy**, **sustainable food security**, **nutrition standards**, and **digital public infrastructure**, initiated under India's leadership, continues to influence **G20 outcomes**.
- **India's 2025 Summit Proposals (Six Global Initiatives) :**
  - **Global Traditional Knowledge Repository**: A digital platform to preserve and share traditional knowledge of civilisations (medicine, agriculture, sustainability), making ancestral wisdom accessible globally.
  - **Africa Skills Multiplier Initiative**: A "train-the-trainer" model aiming to certify one million trainers in Africa over the next ten years, to build lasting human capital across the continent and promote inclusive growth.
  - **Global Healthcare Response Team**: A proposal aimed at strengthening global health cooperation, preparedness and equitable access to healthcare — reflecting India's emphasis on public health and global welfare.
  - **Open Satellite Data Partnership**: Encouraging shared satellite data among nations for climate, disaster resilience, agriculture, and development uses — supporting global monitoring and sustainable development efforts.

- **Critical Minerals Circularity Initiative**: Promoting sustainable use, recycling and circular economy models for critical minerals (needed for renewable energy, batteries, green tech) — a step toward resource security and green transition.
- **Initiative on Countering the Drug–Terror Nexus**: Addressing global security concerns by linking drug trafficking and terrorism, advocating for coordinated multilateral action to break this linkage.

What are the Key Factors Undermining the G20's Ability to Address Today's Global Challenges?

- **Geopolitical Divisions Fragment Consensus:** **Geopolitical tensions** between **major powers** severely undermine **G20 unity**.
  - **US-China rivalry**, the **Russia-Ukraine war**, and **Middle East conflicts** create irreconcilable positions.
  - At the **2025 Johannesburg Summit**, **US President Trump** boycotted over **agenda disputes** with **South Africa**, while **China's Xi Jinping** and **Russia's Vladimir Putin** did not attend, leaving only 17 leaders and turning it into a **middle powers forum**.
  - **Russia and China** routinely block explicit **Ukraine condemnations**, forcing **vague language** that dilutes **actionable outcomes**.
- **Consensus-Based Decision-Making Leads to Paralysis:** The G20 requires **unanimous agreement** among its **diverse members**, resulting in **lowest-common-denominator compromises**.
  - During the **2022 Bali Summit**, Ukraine references were heavily softened to accommodate Russia. Though, the **2023 New Delhi Summit** avoided the issue entirely.
  - The **US** prioritizes **macroeconomic stability**, while **Brazil and India** emphasize **SDGs** and **climate justice**. Without **majority voting** or **enforcement mechanisms**, declarations remain **non-binding recommendations**.
- **Chronic Implementation and Delivery Gaps Persist:** G20 **pledges** consistently fail to materialize into action. The **climate finance commitment** for **developing nations** was met late.
  - The **Common Framework** for **debt restructuring** has assisted very few **low-income countries** facing a massive **sovereign debt crisis**.
  - **Fossil fuel subsidies** remained high despite phase-out pledges.
  - The **Debt Service Suspension Initiative** temporarily aided nations but expired without **permanent renewal**.
- **Surge in Unilateralism and Protectionist Policies:** Rising **unilateral actions** erode **multilateral trust**. Trump's proposed **tariffs** and his **G2 condominium** idea with China bypass G20 processes.
  - A strong **US dollar** has inflated **emerging market debt**. The **US Inflation Reduction Act** prompted **EU complaints** over **discriminatory subsidies**, while **protectionism** undermines **WTO commitments** that G20 members endorse.
- **Deepening North-South Equity and Inclusivity Divide:** The G20's **wealthy-dominated membership** exacerbates **global inequities**.
  - **Official development assistance** from rich nations declined post-COVID. The **Global South** demands **debt-for-climate swaps** and **climate justice**, unmet amid a wide **digital divide** affecting developing regions.
  - **Youth NEET (Not in Employment, Education, or Training)** rates remain high in Africa and Latin America despite Johannesburg targets.
  - The **African Ubuntu theme** highlighted these gaps symbolically but delivered no new funds, as **ODA cuts** sideline **poorer voices**.
- **Absence of Formal Institutional Framework:** Lacking a **permanent secretariat**, **budget**, or **staff**, the G20 relies on **rotating presidencies** that breed inconsistency.
  - **South Africa's 2025 term** faced coordination issues; the upcoming **US 2026 presidency** raises **impartiality concerns**.

- US President **Donald Trump** announced that **South Africa** will **not be invited** to the **2026 G20 summit**, marking the first time in the forum's history that a **member nation** has been **excluded**.
- The **Data Gaps Initiative (DGI-3)** shows **uneven progress**, only a few G20 economies compile **energy accounts**.

- **Agenda Overload and Mission Creep Dilute Focus:** Originally focused on **financial crises**, the G20's portfolio has expanded to **AI governance**, **health pandemics**, **migration**, and **inequality**, spreading resources thin.
  - This comes at a time when the **WTO Appellate Body has collapsed with no credible roadmap for revival**, weakening the rules-based trading system, while the **BEPS global minimum tax reforms are facing repeated delays**, reflecting widening divergences among major economies and slowing momentum for coordinated tax governance.
  - **Fossil fuel subsidies** persist despite long-standing commitments, proving the forum's **portfolio had grown too large**.

What Major Reforms are Required to Enhance the G20's Effectiveness in Global Governance?

- **Establishing a Permanent Secretariat:** The G20 lacks a **formal secretariat**, resulting in **inconsistent coordination** and **follow-up**.
  - Countries should establish a **permanent secretariat** in a neutral location like **Geneva** or **Singapore**, staffed with around **200 professionals** and funded through **member contributions**.
  - This body would oversee the **implementation of commitments**, maintain **institutional memory**, and publish **transparent progress reports** on pledges.
  - The absence of such a structure has contributed to **low success rates** in areas like the **Common Framework for debt relief**, where only **7% of high-risk debt** has been reduced so far.

- **Introducing Qualified Majority Voting:** The current **unanimity requirement** causes **delays** and **dilutes policy decisions**.
  - Implementing a **qualified majority voting system** (for example, **75% approval** for non-security issues) would allow the G20 to reach decisions more efficiently, avoiding **watered-down compromises** witnessed in recent summits.
  - This would catalyze **faster action** on critical issues like **climate finance**, **digital governance**, and **debt restructuring**.

- **Reforming the Debt Relief Mechanism:** The G20 **Common Framework for debt treatment** has been hampered by **slow procedures** and **inefficiencies**, leading to **limited relief** despite growing **debt crises** in **low-income countries**.
  - G20 members should **streamline negotiation timelines**, **extend debt relief offerings**, and mandate the inclusion of **private creditors** to ensure **coordinated debt restructuring**.
  - As of late 2025, only a handful of countries like **Ghana** and **Zambia** effectively benefited from the mechanism, with relief amounts **insufficient** against the overall **debt burden**.

- **Ensuring Timely Climate Finance Delivery:** Though the G20 pledged **$100 billion annually** to support developing countries' **climate efforts**, this target was only met with a **significant delay**.
  - The G20 must formalize **delivery schedules** and link finance disbursements to **verified progress** on climate action.
  - Fully operationalizing the **Loss and Damage Fund** and scaling **clean energy access initiatives** are critical for meeting **global climate goals**.

- **Expanding Inclusiveness and Representation:** The G20's current membership, while covering major economies, leaves many rising and developing nations **unrepresented**.
  - The group should expand to include key countries such as **Nigeria** and **Indonesia** and push for **reforms in global financial institutions**

to grant greater **voting power** to **Global South** nations.
- This increased inclusivity will enhance **legitimacy** and ensure that diverse **developmental perspectives** guide G20 policies.

- **Streamlining the G20 Agenda and Accountability Mechanisms:** The broadening scope of the G20's agenda risks **diluting focus** and **resources**.
  - The group should prioritize **core themes**—such as **finance**, **climate action**, **global trade**, and **social inclusion**—with clear **accountability frameworks**, **sunset clauses** for stalled initiatives, and **mid-term progress reviews** with contributions from **civil society** and **independent experts**.
  - The **restoration of WTO mechanisms** and the **phasing out of fossil fuel subsidies** are areas requiring **urgent attention**.
- **Developing Governance for Digital and AI Technologies:** Rapid **digitalization** and **AI advancements** require a collaborative framework to ensure **ethical use**, **data privacy**, and bridging the **digital divide**.
  - The G20 should negotiate a **digital governance accord** that promotes **fairness** and **inclusion** while funding **infrastructure development** to connect populations currently **lacking access**, especially in the **Global South**.

Conclusion:

A **stronger and more accountable G20** is vital for rebuilding **trust in multilateralism** and effectively addressing global challenges such as **climate finance**, **sovereign debt distress**, and **digital governance**. As foreign policy experts caution, ***"Solving the world's problems requires global cooperation based on agreed rules; the alternative is the law of the jungle, where problems don't get solved."*** This underscores the urgent need for the G20 to evolve into a more **responsive**, **inclusive**, and **implementation-driven** institution capable of shaping a stable global future.

Drishti Mains Questions

1. India's partnership with ASEAN has evolved from historical and cultural linkages to a strategic convergence in the Indo-Pacific, yet gaps remain between intent and implementation. Discuss the key areas of convergence and friction between India and ASEAN, and suggest measures to transform the partnership into a more result-oriented and resilient framework.
2. Rare earth minerals have become indispensable to global tech and security frameworks. Critically examine India's strategic interests and the challenges related to its rare earth sector.
3. The paradox of high agricultural employment but low productivity reflects structural and institutional rigidities rather than resource scarcity. Discuss.
4. "Democracy flows strongest through empowered local streams."Examine the hurdles that impede Panchayati Raj Institutions from realising their full potential of grassroots democracy. Suggest remedial reforms.
5. "Degradation of forests is a silent crisis in India."Critically examine the success and limitations of India's restoration and afforestation policies.
6. "As India stands at the crossroads of growth and inequality, Universal Basic Income (UBI) offers a pathway to restore economic dignity and social justice, but its implementation poses serious fiscal and structural challenges." Comment.
7. Critically examine how India's growing road accident crisis reflects deep-rooted systemic challenges. Suggest comprehensive policy measures to enhance road safety.
8. "India's wildlife conservation efforts have evolved from species-centric protection to ecosystem and community-based management, yet governance and enforcement challenges persist." Discuss in the context of recent developments and evaluate how India can align its wildlife conservation strategy with the Sustainable Development Goals.
9. "As Artificial Intelligence becomes a new arena of global power, shaping its governance framework is as much about ethics as it is about geopolitics." Discuss India's role and strategy in ensuring an inclusive and equitable global AI order.
10. Discuss the key challenges India faces in effectively countering terrorism? How can India evolve a multi-dimensional strategy to combat emerging terrorist threats?
11. "India–Sri Lanka relations are marked by both convergence of interests and persistent irritants." Examine the major challenges affecting bilateral ties and suggest measures to institutionalise sustainable cooperation.
12. As India strives for Viksit Bharat by 2047, self-reliance has become a strategic imperative. What core structural and governance bottlenecks hinder this transition?

Drishti Mains Questions

13. "India's renewable energy transition is not merely an environmental imperative but an economic opportunity." Discuss the progress made so far and the challenges that need to be addressed to achieve a sustainable energy future.
14. Examine the challenges faced by the contemporary global nuclear order and suggest measures to strengthen nuclear stability and non-proliferation.
15. "Privacy as a fundamental right was affirmed by the Supreme Court in the KS Puttaswamy Case (2017)."Discuss how India's Digital Personal Data Protection Act, 2023, and Rules, 2025, operationalise this right and the challenges in its implementation.
16. The India-Africa partnership is often described as a "bridge of shared histories and common futures."Critically examine how this partnership can be transformed to address contemporary developmental and geopolitical challenges.
17. India's groundwater crisis is no longer a problem of scarcity alone but one of contamination, over-extraction, weak governance, and climate stress. Discuss the key drivers of this crisis and evaluate the effectiveness of current policy responses. How can India move towards sustainable and equitable groundwater management? (250 words)
18. "India's urban growth demands a shift from top-down, infrastructure-heavy planning to human-centred, climate-resilient and design-driven urbanism. Discuss the key transformations required to steer India toward sustainable and equitable urban development."
19. "Despite multiple export-promotion schemes, India's export competitiveness remains constrained by structural challenges." Discuss in light of recent policy developments.
20. Labour markets are central to India's development trajectory. Discuss the key challenges and policy measures needed to strengthen labour governance in India.
21. COP30 marked a critical juncture in accelerating the implementation of the Paris Agreement. Analyse the key initiatives launched during the conference and evaluate their significance for closing the global ambition and implementation gaps.
22. Discuss the key challenges to foundational literacy and numeracy (FLN) in India.What measures can address them?
23. Examine the main factors driving brain drain from India and evaluate the effectiveness of government initiatives aimed at retaining skilled professionals.
24. "Antimicrobial resistance (AMR) is no longer a health-sector issue but a cross-sectoral development crisis. Critically examine the key factors driving AMR in India and evaluate the effectiveness of recent government initiatives in addressing it under the One Health framework."
25. Discuss the contemporary geopolitical and economic challenges weakening the G20's role in global governance. What core reforms are needed to strengthen its effectiveness?