



# MONTHLY EDITORIAL CONSOLIDATION

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## India-US Strategic Synergy

*This editorial is based on “[Clearing the fog on the state of India-US relations](#)” which was published in The Hindustan Times on 01/07/2025. The article brings into picture the evolving India-U.S. relationship, highlighting a shift towards long-term strategic cooperation in technology, defense, and economic growth.*

**Tag:** GS Paper - 2, Bilateral Groupings & Agreements, Effect of Policies & Politics of Countries on India's Interests, Indian Diaspora, Groupings & Agreements Involving India and/or Affecting India's Interests

[India's relationship with the U.S.](#) is evolving beyond traditional frameworks, with a focus on mutual strategic interests such as technology, defense, and economic growth. Recent joint statements and new frameworks for collaboration signal a deepening partnership. However, despite external challenges and fluctuating narratives, India needs to chart a new chapter in its ties with the U.S., emphasizing sustainable, long-term cooperation across diverse sectors. The evolving dynamics reflect a shared commitment to addressing global challenges while enhancing bilateral ties. This moment calls for India to redefine its relationship with the U.S. through pragmatic and visionary diplomacy.

### How India-US Relations Evolved Over Time?

- 💡 **Early Years (1947-1960s)-Cold War Tensions and Diverging Ideologies:** In the early post-independence years, India adopted a **non-alignment** policy under **Jawaharlal Nehru**, which often placed it at odds with the US, particularly during the Cold War.
  - ✦ The US, keen on containing the spread of communism, aligned with Pakistan, India's neighbor, which led to strained relations.
- 💡 **1970s- Nuclear Tensions and Divergence:** The 1970s marked a significant low in India-US ties, driven largely by India's **nuclear ambitions**.
  - ✦ In **1974**, India conducted its first **nuclear test** (Smiling Buddha), which angered the US and led to the imposition of **sanctions** under [Nuclear Non-Proliferation Treaty \(NPT\) norms](#).

- ✦ Furthermore, the US's support of **Pakistan** during the **1971 Indo-Pakistan War** and its involvement in the **Bangladesh Liberation War** created further friction.

- 💡 **1980s-Attempts at Repairing Ties:** In the 1980s, despite differences, there were efforts to stabilize relations. **Indira Gandhi's** state visit to the US in **1982** sought to repair ties, focusing on **trade and nuclear cooperation**.

- ✦ However, the [Bhopal Gas Tragedy](#) of **1984** and continued nuclear tensions kept the relationship under stress.

- ✦ The **Soviet invasion of Afghanistan** in 1979 was a critical event, where India and the US found common ground in opposing Soviet expansion, although India's closeness to the USSR remained a challenge for the US.

- 💡 **1990s- A New Era of Engagement Post-Cold War:** The end of the Cold War and the **collapse of the Soviet Union** in **1991** opened a new chapter in India-US relations.

- ✦ The **economic reforms** initiated by **Prime Minister P.V. Narasimha Rao** transformed India's economy, making it more integrated with the global market, and particularly with the US.

- ✦ The **1991 Gulf War** marked the beginning of US interest in India as a strategic partner in the **Asian** region.

- ✦ Additionally, the **nuclear tests** by India in **1998** (Pokhran II) led to **sanctions** once again, but these were lifted relatively quickly, signaling a shift towards a more pragmatic and cooperative relationship in the coming years.

- 💡 **2000s-Strategic Partnership and Civil Nuclear Deal:** The 2000s saw a significant transformation in India-US ties, especially after **President Bill Clinton's** visit to India in **2000**, the first visit by a sitting US president in over two decades.

- ✦ The **2005 US-India Civil Nuclear Deal** was a landmark moment in bilateral relations, marking a strategic pivot.

- ✦ The deal ended a 30-year US embargo on nuclear cooperation with India, recognizing India as a nuclear power and promoting cooperation on **nuclear energy and security**.

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💡 **2010s-Strengthening Strategic and Defense Ties:** Under **President Obama**, India-US relations grew stronger, focusing on **defense cooperation**, **counterterrorism**, and **economic partnership**.

- ✦ The **2010 US-India Civil Nuclear Agreement** was followed by **strategic dialogues**, and in **2016**, the US designated India as a **Major Defense Partner**, cementing military cooperation, including **joint military exercises**.
- ✦ India's inclusion in the **Asia-Pacific** strategy, its participation in the **Quadrilateral Security Dialogue (Quad)** with the US, Japan, and Australia, and the signing of key **military agreements** (**Logistics Exchange Memorandum of Agreement**, **Communications Compatibility and Security Agreement**) showed a deepening defense and strategic alignment between the two countries.

💡 **2020s-A Comprehensive Global Partnership:** The 2020s have seen India and the US consolidate their partnership as a key pillar of global security and economic stability.

- ✦ The **Indo-Pacific** strategy, shared concerns over **China's rise**, and **climate change** have propelled cooperation into new areas, such as

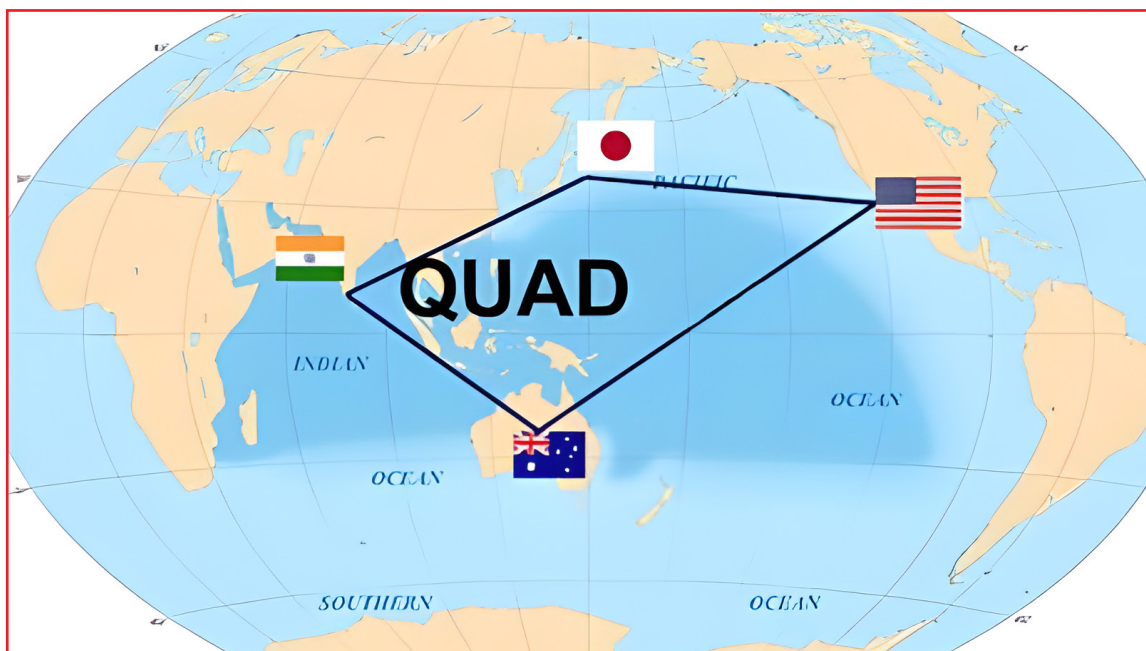
cybersecurity, clean energy, and artificial intelligence.

- ✦ India also joined the **Artemis Accords** and **Mineral Security Partnership** that further strengthened the ties.

### What are the Key Areas of Cooperation Between India and the US?

💡 **Defense and Strategic Ties:** The US has designated India as a **Major Defense Partner**, marking a significant shift in defense ties. The cooperation is expanding in **intelligence sharing**, **military exercises**, and **defense technology transfers**.

- ✦ For example, the **Communications Compatibility and Security Agreement (COMCASA)** signed in 2018, grants India access to advanced communication technologies for real-time data sharing during joint operations.
- ✦ In **2024**, both countries signed an agreement for the **MQ-9B Reapers**, enhancing India's surveillance capabilities.
- ✦ India is part of the **Quadrilateral Security Dialogue (Quad)**, conducting joint military exercises like **Malabar** with the US, Australia, and Japan, reflecting their shared security interests in the Indo-Pacific.



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💡 **Technology and Innovation:** The India-US partnership is increasingly defined by collaboration in **emerging technologies** such as artificial intelligence (AI), semiconductors, and space exploration.

✦ The **Initiative on Critical and Emerging Technologies (iCET)** launched in 2023, focuses on strengthening these ties, providing India access to cutting-edge technologies while fostering innovation ecosystems in both countries.

✦ In **2023**, the US and India committed to **\$825 million** investments in **India's semiconductor industry**, reflecting their shared interest in technological leadership.

💡 **Economic and Trade Relations:** In 2024-25, the US remained India's largest trading partner for the fourth consecutive year, with **bilateral trade reaching \$131.84 billion**.

✦ **FDI inflows** from the US to India totaled **\$4.99 billion** in FY 2023-24, marking the US as India's third-largest source of foreign direct investment.

✦ In **2024**, both countries signed a **Memorandum of Understanding (MoU)** to promote cooperation on **Small and Medium Enterprises (SMEs)**, highlighting mutual interest in boosting sectors that support innovation and growth.

💡 **Climate Change and Clean Energy Cooperation:** The climate change agenda has seen significant alignment between India and the US, particularly under the **Climate and Clean Energy Agenda 2030** partnership.

✦ The **US-India Roadmap** on clean energy, launched in **2024**, aims to build **safe and secure global clean energy supply chains**, with \$1 billion in multilateral financing.

✦ In **2023**, the **India-US Renewable Energy Technology Action Platform (RETAP)** fostered collaboration on lab-to-lab cooperation, piloting cutting-edge energy technologies.

💡 **Counterterrorism and Security Cooperation:** Terrorism remains a significant shared concern,

with both India and the US working closely on **intelligence sharing, counterterrorism operations, and joint law enforcement efforts**.

✦ The **India-US Joint Working Group on Counterterrorism** has held regular meetings, most recently in **March 2024**, ensuring real-time cooperation on operational matters.

✦ Following the **2019 Pulwama attack** in Kashmir, both nations enhanced their counterterrorism cooperation, with the **FBI** actively supporting Indian authorities.

✦ In **2023**, both countries expanded **cybersecurity** efforts under their bilateral framework, addressing emerging threats in the digital realm, underlining the growing relevance of **cybersecurity** in modern counterterrorism.

💡 **Space Exploration and Cooperation:** India and the US have a long history of collaboration in space exploration, with both nations working together on **space science, satellite technology, and human spaceflight missions**.

✦ The **civilian space cooperation** between the **Indian Space Research Organisation (ISRO)** and **NASA** is set to expand, with numerous collaborative ventures underway.

📎 The **Chandrayaan-1 mission**, launched in **2008**, was a hallmark of India-US collaboration, as it carried instruments developed by NASA.

✦ The **NASA-ISRO Synthetic Aperture Radar (NISAR) satellite**, set to launch in **2025**, will jointly advance research in Earth observation, particularly in disaster management and climate science.

✦ **NASA's Axiom Mission 4**, featuring **ISRO astronaut Shubhanshu Shukla**, is a hallmark of India-US Space collaboration.

### What are the Key Areas of Friction Between India and the US?

💡 **Trade Imbalances and Market Access:** Trade imbalances between India and the US have been a persistent point of contention.

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✦ The US has regularly criticized India for its **high tariffs** and **restrictions** on foreign investments in specific sectors, while India is frustrated by **US trade practices** and **protectionism** under recent administrations.

✦ For example, in 2019, the US ended India's **preferential trade status** under the **Generalized System of Preferences (GSP)**, citing India's refusal to provide "equitable and reasonable access" to its markets.

📎 In response, India imposed **retaliatory tariffs** on 28 US products, escalating trade tensions.

💡 **US-India Divergence on Russia and Defense Purchases:** India's continued defense ties with **Russia** remain a major point of contention between the two nations.

✦ Despite growing military cooperation with the US, India continues to purchase **Russian defense equipment**, including **S-400 missiles**, which has led to tensions under **US sanctions (CAATSA - Countering America's Adversaries Through Sanctions Act)**.

✦ Despite these frictions, India continues to prioritize its defense needs, which has prompted India to maintain a **diversified defense procurement strategy**.

💡 **Data Privacy and Digital Trade Concerns:** The US has expressed concerns about **India's data privacy laws**, particularly regarding the **Personal Data Protection Act, 2023**.

✦ The act's provisions on data localization and its potential impact on US tech giants like **Google**, **Facebook**, and **Amazon** have created friction.

📎 India's push for **data sovereignty** challenges the operational flexibility of US-based tech firms, while the US government raises concerns about the potential **overreach** of India's proposed laws.

✦ This regulatory divergence risks **disrupting cross-border digital trade** and raises questions about the future of **US-India tech collaboration**.

💡 **Intellectual Property Rights and Patent Disputes:** Intellectual Property (IP) rights have been a recurring issue in India-US relations.

✦ The US has frequently criticized India's **patent laws** for not sufficiently protecting **pharmaceutical patents**, which it claims affects the profitability of US-based pharma companies.

📎 India's **generic drug industry**, which produces affordable medications for developing countries, is often at **odds with the US pharmaceutical sector's demand for stronger IP protection**.

✦ In 2023, India was named in the **US Trade Representative's (USTR) Special 301 Report** as a country of concern regarding **IP enforcement**.

✦ India's stance on **patent-free drugs**, including those for **HIV/AIDS**, is seen as essential for public health, but it places India at odds with the US pharmaceutical industry, which claims that patent rules need strengthening.

💡 **China-US Rivalry and India's Neutrality:** While the US and India share concerns about **China's rising influence** in the Indo-Pacific and the global stage, India's approach to the **US-China rivalry** is more cautious.

✦ India prefers to maintain **strategic autonomy**, avoiding any overt alignment that could make it part of a **US-China conflict**.

📎 This careful balancing act often leads to **friction when the US pushes India to take stronger positions against China**, especially in multilateral forums.

✦ In 2021, the **Quad Summit** was more focused on **cooperative regional security** than directly countering China, reflecting India's preference for engagement with China, despite its growing security ties with the US.

✦ As the **US-China trade war** escalates, India finds itself caught between **maintaining strategic ties with the US** and its **economic relations with China**, a situation that complicates its foreign policy.

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💡 **H1-B Visa and Immigration Disputes:** One of the most significant sources of tension in India-US relations is the issue of **H-1B visas**, which are crucial for Indian IT professionals seeking employment in the US.

- ✦ The US has frequently imposed stricter regulations and caps on these visas, which disproportionately affect Indian workers.
- ✦ India has expressed concern over these limitations, as they impact **economic opportunities** for highly skilled professionals and disrupt the growth of **India's IT services exports** to the US.

📌 In **2017**, President Trump's administration introduced the **"Buy American, Hire American"** initiative, which directly impacted Indian tech companies that rely on H-1B visa holders.

- ✦ The reduction in the availability of these visas could also impact India's IT export industry, which is heavily reliant on American clients.

💡 **US Sanctions and India's Relationship with Iran:** India's strategic interests in the **Middle East** often lead to tensions with the US, particularly concerning its relationship with **Iran**.

- ✦ Despite the US's **sanctions** against Iran, India has maintained **energy ties** with Tehran, particularly for its oil imports, and has been part of the **International North-South Transport Corridor (INSTC)** that links India to Iran.

📌 The US views this as undermining its **sanctions** on Iran, which creates a diplomatic rift between the two countries.

- ✦ In **2018**, following the US's withdrawal from the **Iran Nuclear Deal**, India continued to engage with Iran, particularly on **energy imports** and the **Chabahar port project**, which is seen as a strategic corridor for trade.

### What Measures can India Adopt to Enhance Ties with the US?

- 💡 **Strengthen Strategic Autonomy while Aligning on Global Challenges:** India can continue to assert its

**strategic autonomy** while deepening cooperation with the US on global issues such as **counterterrorism, climate change, and technology**.

- ✦ By focusing on areas of **shared interests** and global challenges, India can **increase its influence in shaping multilateral solutions**, ensuring that its sovereignty is respected while reinforcing the collaborative nature of the relationship.

- ✦ This approach will allow India to **engage constructively** with the US without being perceived as overly dependent, thus ensuring long-term **co-development** and a balanced partnership.

💡 **Enhance Technology and Innovation Collaboration:** India should take proactive steps to **deepen technology partnerships** with the US by investing in **co-development** initiatives in sectors such as **artificial intelligence, renewable energy, and semiconductors**.

- ✦ Both countries can jointly explore **cutting-edge technologies** with a focus on making these innovations globally scalable, especially in emerging markets.

💡 **Comprehensive Economic Engagement through Multilateral Initiatives:** India can further expand its economic partnership with the US by engaging more actively in **multilateral trade frameworks** like the **Indo-Pacific Economic Framework (IPEF)**, where both nations have significant interests.

- ✦ Strengthening ties through **supply chain integration** and **cross-border investments** will help create **interdependence** and ensure greater market access for both.

- ✦ By focusing on creating **global economic initiatives** that involve both the US and India in key sectors like **green energy, sustainable infrastructure, and smart manufacturing**, both countries can drive joint prosperity.

💡 **Commit to Shared Defense Capabilities and Security Innovation:** To enhance defense relations, India should actively pursue **co-production** and **co-development** of defense technologies with the US, building on existing frameworks.

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✦ By focusing on areas like **advanced surveillance systems**, **cybersecurity**, and **autonomous defense technologies**, India can not only strengthen its own defense capabilities but also contribute to **global security innovation**.

✦ This joint commitment to security will lead to greater **military interoperability**, fostering mutual reliance and a stronger strategic foundation.

💡 **Human-Centric Diplomacy for Cultural and Academic Collaboration:** India can enhance people-to-people ties with the US by investing in **educational exchanges**, **research collaboration**, and **cultural diplomacy**.

✦ Programs like the **Fulbright-Nehru Fellowship** can be expanded to create a continuous exchange of **knowledge** and **innovation** across academic institutions.

✦ By focusing on **collaborative academic ventures**, particularly in areas like **climate science**, **public health**, and **quantum computing**, India and the US can build a foundation of **mutual respect** and **shared knowledge**, leading to **co-development** in critical sectors for future generations.

💡 **Advocate for a Transparent and Inclusive Global Governance Framework:** India can take a more active role in advocating for **reform of global governance institutions** like the United Nations Security Council, where it has long sought a permanent seat.

✦ By working alongside the US and other democratic nations, India can promote an inclusive, **rules-based international order**, ensuring that the needs of **emerging economies** are incorporated into global decision-making processes.

💡 **Pursue Climate Justice through Collaborative Clean Energy Projects:** India can position itself as a **leader in sustainable development** by scaling up **collaborative clean energy projects** with the US, particularly in **renewable energy** and **carbon capture technologies**.

✦ Joint initiatives, particularly in the **solar energy** sector, can help both nations meet their climate goals while addressing the urgent global need for **climate justice**.

✦ By leading in the development of **affordable green technologies**, India and the US can create **market-driven solutions** for a **carbon-neutral future**, aligning their interests in environmental leadership.

💡 **Refine and Expand Cybersecurity and Digital Cooperation:** As digital security threats continue to rise, India and the US must prioritize **cybersecurity cooperation**, including **data protection**, **AI-driven defense systems**, and **counter-cyber terrorism** measures.

✦ India can propose the establishment of **permanent joint cybersecurity task forces** to foster innovation in **secure digital infrastructure**, benefiting both countries' economic growth.

✦ This **co-dependence** in **cybersecurity** will provide shared benefits, allowing both nations to stay ahead in the **global digital arms race** while reinforcing trust in the technological domain.

💡 **Promote Comprehensive Health Diplomacy:** India should leverage its growing **biopharmaceutical** capabilities to strengthen its health diplomacy with the US, particularly in areas like **global health security** and **pandemic preparedness**.

✦ By engaging in joint **public health initiatives** and **research on emerging diseases**, both countries can build a **robust health partnership** that benefits the global community.

✦ This collaboration will foster mutual **interdependence**, ensuring both nations are better equipped to handle future global health crises, making the partnership more resilient and forward-looking.

### Conclusion:

India-US relations have evolved from **historical tensions to a robust strategic partnership**, defined by mutual cooperation in defense, trade, technology, and global governance. As **S. Jaishankar aptly put it, "The**

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*India-US relationship has steadily strengthened across successive American presidencies,” emphasizing their growing interdependence. With a shared commitment to global peace and prosperity, the partnership is poised for even greater collaboration in the future.*

## 10 Years Of Digital India Mission

*This editorial is based on “**Digital decade: India’s journey from inclusion to tech innovation**” which was published in *The Business Standard* on 01/07/2025. The article brings into picture the transformative journey of Digital India, highlighting its success in expanding tech access and boosting digital transactions.*

**Tag:** GS Paper - 2, Government Policies & Interventions, E-Governance, GS Paper - 3, Inclusive Growth, Achievements of Indians in Science & Technology

Ten years ago, India launched **Digital India** to democratize technology access. The mission has achieved remarkable success—**internet connections grew from 250 million to 970 million, UPI processes 100+ billion transactions annually, and Direct Benefits Transfer** has saved ₹3.48 trillion while empowering MSMEs nationwide. Digital India has evolved from a government program into a people’s movement, fundamentally transforming governance, commerce, and daily life across the nation. However, **as India shifts from digital governance to global digital leadership**, the road ahead requires sustained focus on **inclusive innovation and technology solutions that truly empower every citizen.**

### What are the Key Strides India Made under Digital India Mission?

- 💡 **Expansion of Digital Infrastructure:** India’s commitment to expanding its digital infrastructure has been pivotal in connecting remote areas and enhancing online accessibility.
  - ✦ This infrastructure serves as the backbone for various **e-governance and financial inclusion initiatives.**
  - ✦ India’s internet penetration has **grown from 250 million in 2014 to over 970 million by**

**2023**, with rural areas increasingly being brought online.

- 📎 Over **400,000 Common Service Centres (CSCs)** have been established, directly bridging the digital divide in rural areas.

💡 **Financial Inclusion Through Digital Payment Systems:** Digital India’s thrust on financial inclusion has revolutionized the payment landscape, making financial services accessible to even the most marginalized sections.

- ✦ **UPI (Unified Payments Interface)** has emerged as a leading tool, driving the digital economy by offering seamless and secure transactions.
- ✦ In FY23, **UPI processed over 8,375 crore transactions** worth ₹139 lakh crore, a sharp increase from 92 crore transactions in FY18.
- ✦ This phenomenal growth shows the role of digital payments in enhancing financial inclusion and streamlining government transfers.

💡 **Aadhaar- A Catalyst for Service Delivery:** Aadhaar has transformed the way India delivers welfare services, enabling seamless and transparent distribution of subsidies and benefits.

- ✦ With over **138 crore individuals enrolled**, it has become the foundation for the **JAM (Jan Dhan-Aadhaar-Mobile) system**, allowing direct benefit transfers (DBT) to beneficiaries, reducing leakages.
- ✦ For instance, DBT has helped transfer **₹44 trillion directly to citizens, saving an estimated ₹3.48 trillion in leakages.**

💡 **Digital Literacy and Empowerment:** Through initiatives like the **Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)**, India has worked towards ensuring digital literacy across rural areas.

- ✦ This has empowered citizens, especially in rural India, to engage with digital services like banking, healthcare, and education.
- ✦ As of 2024, **over 48 million rural citizens have been certified under PMGDISHA**, equipping them with essential digital skills.

- 📎 This shift is also supported by the **government’s efforts to provide digital**

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training to over 6 crore rural households, addressing the digital divide and making digital platforms more inclusive.

💡 **Emerging Technologies Driving Innovation:** India has strategically positioned itself to harness emerging technologies such as **Artificial Intelligence (through IndiaAI Mission, MuleHunter.ai of RBI), Blockchain (Vishvasya-Blockchain Technology Stack), and the Internet of Things (IoT).**

✦ These technologies are now being used in various sectors like agriculture, health, and governance.

✦ For example, the **AI-driven chatbot introduced by PM-Kisan** has empowered over 5 lakh farmers by providing real-time updates on eligibility and payment status.

📌 India's focus on AI has led to the establishment of AI centres of excellence and recognition as a leader in AI skill penetration globally, as ranked by the Stanford AI Index.

💡 **E-Governance and Transparent Service Delivery:** The Digital India mission has streamlined government service delivery through e-governance platforms like **UMANG, DigiLocker, and e-Sign, ensuring transparency and efficiency.**

✦ UMANG now offers over 2,077 services, with more than 7 crore users accessing government services seamlessly.

✦ The digitalization of public services has significantly reduced paperwork and corruption, as evidenced by over 19 crore e-Signatures issued, providing legal verification for government documents.

✦ Schemes like **SVAMITVA** have issued over 2.4 crore property cards and mapped 6.47 lakh villages, thereby ending years of land-related uncertainty.

💡 **Digital Health Infrastructure and Telemedicine:** India's digital health infrastructure has seen exponential growth, especially through platforms like **eSanjeevani, which provides telemedicine services, and CoWIN, which facilitated the world's largest vaccination drive.**

✦ With 38.18 crore patients registered and millions more benefiting from online consultations, these initiatives have ensured that health services reach even the most remote areas.

✦ The **Ayushman Bharat Digital Health Mission** is set to integrate over 67 million Ayushman Bharat Health Accounts, improving healthcare accessibility and monitoring across the country.

💡 **Development of Digital Public Infrastructure (DPI):** India's DPI, epitomized by platforms like Aadhaar, UPI, and DigiLocker, has set a global benchmark in digital governance.

✦ These platforms enable secure, interoperable services, enhancing transparency, accountability, and access.

✦ As of 2024, **Aadhaar has generated over 2 billion monthly authentication transactions.** These technologies not only streamline public service delivery but also bolster the digital economy, contributing significantly to India's growth as a digital superpower.

💡 **Skilling and Employment through Technology:** The government's efforts to reskill the workforce through initiatives like **FutureSkills Prime** and the **expansion of tech ecosystems** have enhanced India's standing as a technology hub.

✦ India has become the world's largest startup ecosystem, **with over 180,000 startups, and is poised to see 60-65 million new jobs** in the digital economy by 2025.

✦ The **FutureSkills Prime** initiative, in partnership with **NASSCOM**, has equipped over 1 lakh IT professionals with cutting-edge skills in AI, Blockchain, and IoT, ensuring that India remains at the forefront of the global tech race.

💡 **Digital Agriculture and Rural Transformation:** The Digital Agriculture Mission is one of India's latest strides towards transforming the agricultural sector.

✦ By leveraging digital platforms like **AgriStack** and **Krishi Decision Support Systems (DSS),**

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India aims to offer farmers access to better tools for crop planning, weather forecasting, and market linkages.

- ✦ The **Krishi DSS**, for instance, integrates geospatial data to assist farmers with crop yield predictions and disaster management.

## What are the Key Issues

### Associated with India's Digital Ecosystem?

- 💡 **Digital Divide and Inequality:** Despite significant strides, India's digital divide remains a critical issue, with a stark gap between urban and rural internet access.

- ✦ While urban areas benefit from high-speed connectivity, rural regions still struggle with unreliable internet access.
- ✦ According to the NSSO data, **only 24% of rural Indian households have access to the Internet**, compared to a 66% penetration in cities.

✍ This disparity limits the effectiveness of digital initiatives, hindering inclusive growth and preventing equitable access to services like e-health and digital education.

- 💡 **Cybersecurity and Data Privacy Concerns:** As India's digital footprint expands, cybersecurity remains a significant challenge, especially **with the increase in cyber-attacks and data breaches**.

- ✦ The rise in digital transactions and the storage of personal data heightens the risks of data theft and privacy violations.
- ✦ India emerged as the **second most targeted nation in terms of cyber attacks** in the world as 95 Indian entities came under data theft attacks in 2024.

✍ Also, the **number of digital arrest scams and related cybercrimes** in the country almost **tripled between 2022 and 2024**, leaving citizens vulnerable to security threats in an increasingly digital world.

- 💡 **Fragmented Digital Infrastructure and Interoperability:** India's digital ecosystem suffers from a **lack of uniformity in its infrastructure, with different states implementing varying levels of digitization**.

- ✦ This fragmentation hampers the seamless delivery of services, especially in a federal system where data-sharing and cross-platform operations are often complex.

- ✦ For instance, **while Aadhaar has made significant inroads**, state-level initiatives like **e-District and e-Governance platforms** often fail to integrate efficiently, leading to disjointed service delivery.

- 💡 **Digital Literacy and Skill Gaps:** Despite large-scale programs like **PMGDISHA**, **digital literacy rates remain low**, particularly in rural areas, where people still struggle to adapt to new technologies.

- ✦ The country faces a pressing need for digital upskilling to ensure that its workforce can meet the demands of a rapidly evolving economy.

- ✦ NSS 78<sup>th</sup> round survey (2020-21) indicates a computer literacy rate of **only 24.7% among individuals aged 15 and above**.

✍ Also, a recent **National Skill Development Corporation report** estimates a deficit of **29 million skilled workers**, with demand spiralling in IT and BFSI, creating a significant barrier to full participation in the digital economy.

- 💡 **Regulatory and Policy Gaps in Emerging Technologies:** India is yet to fully regulate emerging technologies like **Artificial Intelligence (AI), Blockchain, and IoT**, leading to uncertainty in their adoption across sectors.

- ✦ The absence of comprehensive policy frameworks for these technologies may delay their integration into critical sectors like healthcare, agriculture, and governance.

- ✦ For instance, India currently **lacks specific laws directly addressing generative AI**. Also, India's copyright framework lacks clarity on AI-generated content.

✍ The government's recent push for **AI centers of excellence is a step in the right direction**, but a significant push is required to integrate AI in governance.

- 💡 **Government-Private Sector Coordination and Vendor Lock-in:** The rapid digitalization efforts in India have led to increased reliance on private tech

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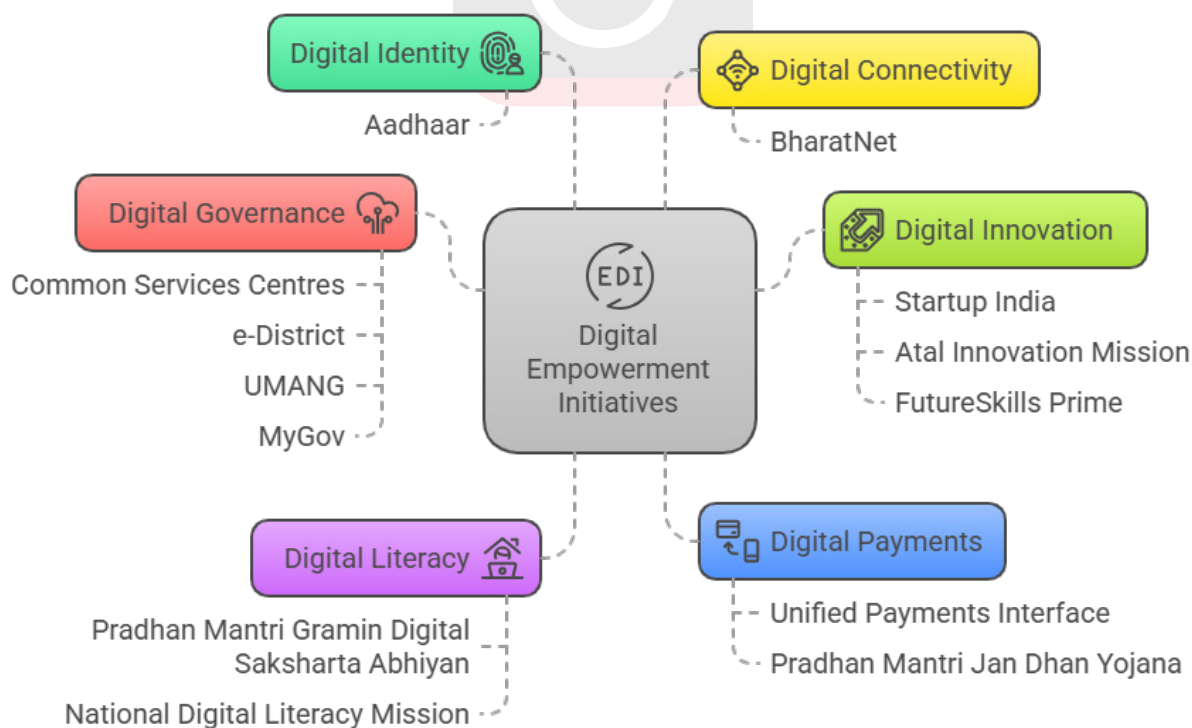
companies, raising concerns about **vendor lock-in and insufficient coordination between the government and private sector stakeholders.**

- ✦ Government initiatives like **GeM and MyGov** rely heavily on private technology providers, and there is little clarity regarding data ownership and privacy.
- ✦ This creates dependency on a few tech giants, which could hinder the flexibility of India's digital ecosystem and make it vulnerable to monopolistic practices.
  - 📌 For instance, while **Aadhaar** is managed by the **Unique Identification Authority of India (UIDAI)**, a statutory body of the Indian government, the **proprietary technology belongs neither to the government nor the UIDAI.**

💡 **Digital Exclusion of Marginalized Communities:** While India's digital transformation has been largely successful, certain marginalized communities still face exclusion due to systemic barriers such as lack of access, education, or awareness.

- ✦ **Tribal populations, many backward classes and women in rural areas** remain the most disadvantaged in this digital revolution.
- ✦ For instance, despite efforts like PMGDISHA, **only 1 in 3 women in India (33%)** have ever used the internet (**National Family Health Survey 2019-21**).
  - 📌 This creates a digital underclass, limiting their access to government services, job opportunities, and social benefits, and exacerbating existing inequalities.

### Indian Government Initiatives for Digital Empowerment



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## What Measures can India Adopt to Enhance Digital Empowerment and Inclusion in India?

- 💡 **Universal Digital Literacy Program:** To ensure inclusive digital participation, **India should implement a nationwide digital literacy program** that focuses on practical skills for both urban and rural populations.
  - ✦ This initiative should **move beyond basic awareness and enable citizens** to use digital tools for **education, financial management, and e-governance**.
  - ✦ By embedding digital literacy in school curriculums and offering free online training, the government can equip individuals to navigate the digital ecosystem effectively, reducing exclusion and building confidence in using technology.
- 💡 **Expansion of Digital Infrastructure in Remote Areas:** A strategic push towards improving internet connectivity and digital infrastructure in remote areas is essential for bridging the rural-urban divide.
  - ✦ **India should prioritize expanding 5G networks in underserved regions** through public-private partnerships and incentivize telecom operators to extend their services.
  - ✦ In parallel, **strengthening last-mile connectivity**, such as **satellite internet solutions or low-cost broadband access points**, will empower communities with better access to digital resources and services.
- 💡 **Localized Content Creation and Access:** For true digital inclusion, India must focus on **creating and promoting content in regional languages** that caters to diverse cultural and social needs.
  - ✦ Government platforms and private enterprises should collaborate to develop **multilingual apps, e-learning platforms**, and government portals that are accessible to non-English speakers.
  - ✦ This will enable individuals from various linguistic backgrounds to access essential services, participate in **e-commerce**, and **engage with educational material without language barriers**.
- 💡 **Public-Private Partnerships for Digital Skill Development:** India should foster public-private partnerships aimed at reskilling and upskilling its workforce for the digital age.
  - ✦ **Collaboration between government bodies, tech giants, and educational institutions** can create specialized training centers to teach high-demand digital skills like coding, cybersecurity, AI, and data analytics.
  - ✦ By promoting certification programs and internships, India can enhance employability and foster entrepreneurship, particularly among youth and marginalized communities.
- 💡 **Incentives for Digital Startups and Innovations:** To create an ecosystem of digital empowerment, India should introduce **incentives for digital startups focused on solving local challenges in education, healthcare, agriculture, and governance**.
  - ✦ Providing **tax exemptions, low-interest loans, and incubators for tech-driven enterprises** will encourage innovation in underserved sectors.
  - ✦ Additionally, promoting a **“Make Tech in India” initiative** will ensure that **digital solutions are culturally relevant, cost-effective, and scalable for the masses**.
- 💡 **Strengthening Data Privacy and Cybersecurity Frameworks:** To enhance trust in digital systems, India must urgently strengthen its data privacy and cybersecurity frameworks.
  - ✦ Introducing **robust privacy laws and setting up regulatory bodies** to oversee data protection will ensure that digital platforms operate transparently and securely.
  - ✦ Public education campaigns on cybersecurity hygiene and safe digital practices, along with better enforcement of data breach protocols, will protect citizens' data and encourage broader digital adoption.
- 💡 **Promoting Digital Health Infrastructure in Rural India:** Digital health solutions must be expanded to rural India to empower citizens in managing their health proactively.

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- ✦ By developing **telemedicine services, digital health records, and mobile health apps**, India can improve access to medical consultations, diagnostics, and treatments in remote areas.
- ✦ Integration of AI-powered health tools with local health services will enable timely medical interventions and ensure equitable access to healthcare services, bridging the urban-rural healthcare divide.
- 💡 **Integrated Digital Governance Platforms:** India can significantly enhance digital inclusion by integrating various government services into a **single, unified platform that is easy to access and navigate**.
  - ✦ A **streamlined, transparent digital governance portal** that offers everything from education and welfare benefits to legal services will simplify the public service experience.
  - ✦ This integration will **not only ensure equitable access but also reduce corruption, delays, and administrative hurdles**, making it easier for citizens to interact with the government.
- 💡 **Integrating Digital Literacy into Social Welfare Programs:** Linking digital literacy with existing welfare programs such as **MGNREGA, PDS, and the National Rural Employment Guarantee Scheme (NREGS)** will empower beneficiaries to access these services digitally.
  - ✦ By ensuring that every recipient of government aid is digitally literate, the government can streamline service delivery, reduce fraud, and provide timely benefits directly into the hands of those who need them most.
- 💡 **Revamping Rural Digital Ecosystems with Integrated Tech Hubs:** The government should promote the establishment of rural digital hubs, which are integrated centers that **offer access to digital services, skill development, and employment opportunities in rural areas**.
  - ✦ These hubs can provide essential resources like computers, high-speed internet, and technical training, while also serving as spaces for innovation and community learning.

- ✦ Such localized tech hubs can stimulate rural entrepreneurship, connect remote communities to global markets, and create local employment opportunities in the digital sector.

### Conclusion:

India's Digital India mission has truly **transformed the nation by making technology accessible, empowering citizens, and bridging gaps across sectors**. The upcoming **Digital India Act** can further streamline and secure this transformation, ensuring a future where technology remains a tool for equitable progress. After all, *"The power of technology lies not just in its innovation but in its ability to uplift every citizen and bring about inclusive development."*

## Navigating India's Maritime Path

*This editorial is based on "[Strategic opportunity: Mazagon-CDPLC deal boosts India's maritime influence](#)" which was published in The Business Standard on 03/07/2025. The article brings into focus the strategic acquisition by India's Mazagon Dock Shipbuilders Ltd of a controlling stake in Sri Lanka's Colombo Dockyard for \$53 million, aimed at countering China's growing influence in the Indian Ocean Region.*

**Tag:** GS Paper - 2, Government Policies & Interventions, GS Paper - 3, Growth & Development, Infrastructure

**India's maritime ambitions** have taken a significant leap forward with **state-owned Mazagon Dock Shipbuilders Ltd** acquiring a controlling stake in **Sri Lanka's Colombo Dockyard for \$53 million**. This strategic move positions India to counter China's growing influence in the **Indian Ocean Region**, where **Beijing already controls the Hambantota port** with a 99-year lease. The success of this venture could serve as a **blueprint for India's broader maritime strategy** in securing critical sea lanes and establishing itself as a reliable partner for regional allies.

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## What are the Key Factors Driving Growth of India's Maritime Sector?

💡 **Port Infrastructure Modernization & Capacity Expansion:** Ongoing port modernization is crucial for boosting cargo handling capacity and operational efficiency across India's ports.

- ✦ Enhanced infrastructure is reducing turnaround times, making Indian ports more competitive on the global stage.
- ✦ For example, **Paradip Port's recent increase in operational efficiency led to handling 145.38 million tonnes of cargo in FY24**, surpassing Deendayal Port.

📎 Additionally, port modernization efforts have increased capacity, with major ports seeing a significant rise from 871.52 million tonnes to 1,629.86 million tonnes between 2014-2024.

💡 **Government Policy Support and Strategic Initiatives:** Government initiatives such as the **Maritime India Vision 2030** and **Sagarmala** aim to position India as a global maritime leader by improving port connectivity and logistics efficiency.

- ✦ These policy frameworks focus on expanding port capacities, reducing logistics costs, and developing green maritime infrastructure.
- ✦ The government has **allocated over ₹37,000 crore for 130 projects under Sagarmala**, ensuring a growth-oriented environment.
- 📎 Moreover, **India's policy of allowing 100% FDI in port infrastructure has attracted significant foreign investment**, boosting economic activity and modernizing operations.

💡 **Sustainability and Green Shipping Initiatives:** With a global shift towards sustainable practices, India's maritime sector is investing heavily in green technologies, such as **hydrogen and LNG-powered vessels**, and renewable energy for port operations.

- ✦ The **Green Tug Transition Program (GTTP)**, aiming to replace conventional tugs with eco-friendly alternatives by 2040, is a prime example.

- ✦ India is also developing green hydrogen hubs at **Paradip, Kandla, and Tuticorin ports**.

📎 According to the Ministry of Ports, Shipping & Waterways, **India's green shipping initiatives align with global emission-reduction goals**, with substantial investments in renewable energy to **make ports carbon-neutral by 2030**.

💡 **Technological Advancements & Digital Transformation:** The rapid adoption of digital technologies such as AI, IoT, and blockchain is transforming port operations, enhancing efficiency and transparency.

- ✦ Platforms like **SAGAR SETU, launched in 2025**, integrate over 80 ports and 40 key stakeholders, **simplifying EXIM-related processes**.
- ✦ This digital transformation aims to cut processing times and reduce human errors, fostering a seamless logistics experience.

📎 By 2024, **Jawaharlal Nehru Port reduced its container turnaround time to 22.57 hours**, surpassing global standards.

📎 Additionally, the **integration of the National Logistics Portal Maritime is streamlining port operations**, improving connectivity, and reducing logistics costs.

💡 **Expansion of Inland Waterways:** The development of inland waterways provides an environmentally sustainable, cost-effective alternative for cargo transportation, reducing congestion on roads and railways.

- ✦ The **Inland Waterways Authority of India (IWAI)** has identified 26 new national waterways, supporting the transport of bulk goods and passenger ferries.
- ✦ This expansion is driving a **710% increase in cargo traffic along national waterways since 2014**.

📎 As of 2023-24, **inland waterways handled 132.89 million metric tonnes (mmt) of cargo**, demonstrating the growing importance of this sector in India's trade and logistics.

💡 **Rise in Global Maritime Trade and India's Export Growth:** India's maritime sector is benefiting from

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an uptick in global trade, particularly with the country's growing exports.

- ✦ As India targets **\$2 trillion in exports by 2030**, its maritime infrastructure is expanding to accommodate increased trade volumes.
- ✦ In FY23, **India's merchandise exports reached \$451 billion**, with a significant share moved via sea.

💡 **Private Sector Participation and Investment:** The increasing involvement of private players in port operations under **Public-Private Partnership (PPP)** models is accelerating the development of India's maritime infrastructure.

- ✦ The shift to an **80% landlord model by 2030** is expected to enhance operational efficiency and reduce costs.

📎 In FY24, **major ports saw a 4.45% increase in cargo handling**, demonstrating the positive impact of private sector involvement.

- ✦ Additionally, **Adani Ports' strategic investments in overseas ports and their expanding operations in India** contribute significantly to the sector's growth, positioning India as a key player in global maritime trade.

💡 **Shipbuilding and Repair Industry Growth:** India's shipbuilding and repair industry is set for significant growth, fueled by government policies like the

**Shipbuilding Financial Assistance Policy (SBFAP) and the "Make in India" initiative.**

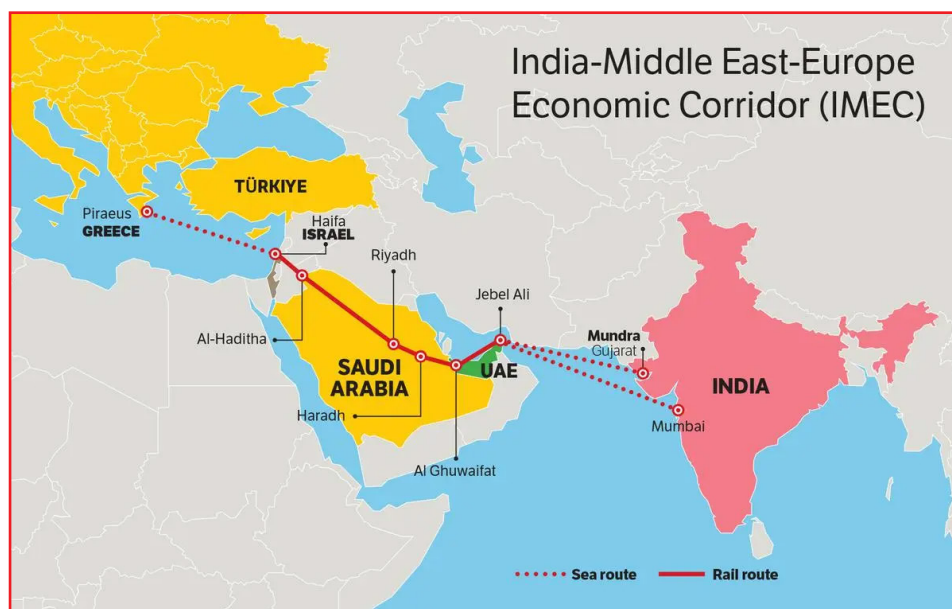
- ✦ These initiatives aim to reduce India's dependency on foreign shipbuilders and boost domestic production of commercial and defense vessels.
- ✦ The SBFAP has led to **313 vessel orders worth ₹10,500 crore (\$1.26 billion) since its launch.**
- ✦ This growth positions India as an emerging global leader in shipbuilding and repair services.

💡 **Strategic Port Acquisitions and Global Integration:** India's strategy of acquiring stakes in key international ports enhances its global maritime presence and strengthens trade ties with strategic partners.

- ✦ India's bilateral agreements, like the operational rights at **Chabahar Port in Iran**, provide access to Central Asian markets, enhancing trade routes.

- ✦ These moves ensure greater control over international shipping lanes and reinforce India's position as a global maritime player.

📎 The **India-Middle East-Europe Economic Corridor (IMEC)**, launched during India's **G20 presidency**, aims to cut logistics costs by 30% and transit time by 40%, making India a pivotal node in international trade.



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## What are the Key Issues

### Associated with India's Maritime Sector?

- 💡 **Aging Fleet and Low Share in Global Shipping:** India's maritime sector faces the challenge of an aging fleet, which hampers its competitiveness in the global shipping market.

- ✦ Despite a rise in domestic ship ownership, India's share in the global fleet remains minimal, constituting **only 1.2% of global tonnage**.

📎 The average age of Indian-flagged vessels was 26 years in 2022-23.

- 💡 **High Logistics Costs and Inefficient Infrastructure:** India's logistics sector, including its maritime component, is burdened by high costs that affect global competitiveness.

- ✦ Logistics costs in India are estimated at **14-18% of GDP**, significantly higher than the **global benchmark of 8%**.

- ✦ The inefficiency in cargo handling, outdated port infrastructure, and regulatory bottlenecks contribute to these high costs.

📎 Despite improvements in container turnaround time at major ports, inefficiencies persist.

- 💡 **Environmental and Sustainability Challenges:** The maritime sector in India is under increasing pressure to address environmental concerns and meet sustainability targets.

- ✦ The rise in **carbon emissions from shipping, particularly CO<sub>2</sub>**, presents a critical issue as India works toward its net-zero goals.

📎 Indian ports and vessels are adopting cleaner technologies, but significant gaps remain.

- ✦ **Visakhapatnam Port Authority (VPA) utilizes 100% renewable energy**, but other ports lag behind significantly.

📎 Moreover, the **Green Tug Transition Program**, aimed at phasing out conventional tugs, has made limited progress, highlighting the sector's slow adaptation to sustainability needs.

- 💡 **Underdeveloped Shipbuilding Industry:** India's shipbuilding industry continues to face significant challenges, including outdated infrastructure, skill gaps, and a reliance on imports for critical materials.

- ✦ Despite efforts like the Shipbuilding Financial Assistance Policy (SBFAP) to boost domestic production, Indian shipyards lag behind global competitors in terms of technological advancements and capacity.

- ✦ For instance, **India's share of global shipbuilding is less than 1%, while China and South Korea dominate the market**.

📎 To become a global shipbuilding hub, India needs to invest heavily in modernizing its shipyards and closing the technological gap that currently exists.

- 💡 **Vulnerability of Coastal Infrastructure to Climate Change:** India's coastal infrastructure, including ports, harbors, and related facilities, **faces increasing vulnerability due to rising sea levels, storm surges, and coastal erosion**.

- ✦ Climate change poses a direct threat to the operational capacity of ports and coastal cities, impacting trade flows and the livelihoods of coastal communities.

- ✦ For instance, **Mumbai, one of India's largest economic hubs**, is at risk of **frequent flooding due to sea-level rise**.

📎 Coastal vulnerability is a matter of concern for India as about **35% of the population lives within 100 km of the country's 7517 km long coastline**.

- 💡 **Security Concerns and Geopolitical Tensions:** The maritime sector in India faces growing security concerns, especially in light of **increasing piracy and territorial disputes in the Indian Ocean Region (IOR)**.

- ✦ India's maritime trade routes are vulnerable to threats from both **non-state actors and geopolitical tensions**, particularly with neighboring countries.

- ✦ **Piracy off the coast of Somalia and the threat of Chinese influence in the IOR** complicate India's strategic positioning.

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- ✍ The recent **Red Sea crisis** and **Houthi rebel attacks** highlight the vulnerability of India to similar maritime security threats, including piracy and geopolitical tensions in the Indian Ocean Region.



- 💡 **Fragmented Governance and Regulatory Challenges:** India's maritime sector suffers from fragmented governance and regulatory inefficiencies, with multiple agencies managing different aspects of the sector.

- ✖ This has led to **delays, increased compliance costs, and confusion among stakeholders.**
- ✖ **Customs clearances at major ports, despite improvements, are still subject to inconsistent inter-agency coordination, causing delays.**
  - ✍ A recent sinking of the **Liberian-flagged container ship MSC Elsa 3 off the Kerala coast in May, 2025.** The vessel carried **hazardous materials like calcium carbide and sulfur**, leading to environmental concerns. The incident highlighted the gaps in India's oil spill contingency planning

- 💡 **Overdependence on Government-Controlled Ports:** India's maritime sector remains heavily dependent on government-controlled ports, limiting competition and innovation in port operations.

- ✖ The lack of **significant private sector participation in key port operations results in inefficiency and suboptimal service quality.**
- ✖ While the shift to the landlord model and private-sector involvement is progressing, it is not yet widespread across all major ports.
  - ✍ The ports like **Visakhapatnam and Chennai** still experience challenges related to **over-reliance on government control**, which can negatively impact their operational efficiency

- 💡 **Limited Integration with Global Supply Chains:** Despite India's strategic position in global shipping lanes, its maritime sector has yet to fully integrate with international supply chains, limiting its potential to capture a larger share of global trade.

- ✖ The country's **reliance on foreign ports for transshipment, especially at ports like Singapore, underscores this gap.**
- ✖ The recently inaugurated **Vizhinjam Port** aims to address this issue, but such projects are few and far between.
- ✖ India must enhance its transshipment capacity and reduce dependency on foreign ports.

### What Measures can India

#### Adopt to Enhance its Maritime Sector?

- 💡 **Accelerating Port Modernization and Digitization:** India must fast-track the modernization of its ports by integrating advanced technologies such as AI, IoT, and blockchain to **streamline operations, reduce turnaround times, and enhance cargo management.**
  - ✖ By establishing **smart ports with automated cargo handling systems** and real-time data analytics, operational efficiency can be significantly improved.
  - ✖ Additionally, creating a unified digital platform for port operations will enable seamless interaction between all stakeholders, eliminating bureaucratic delays and increasing competitiveness in the global maritime industry.

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💡 **Developing a Robust Maritime Security Framework:** A comprehensive maritime security strategy should be implemented to **counter piracy, safeguard national interests, and secure maritime trade routes.**

- ✦ Strengthening coordination among national defense, coast guards, and international security organizations is essential.
- ✦ India should invest in **surveillance systems, maritime domain awareness, and regional cooperation** through the **Information Fusion Centre** to enhance security across the Indian Ocean.
  - 💡 Ensuring the safety of critical ports and trade routes is a fundamental step towards bolstering maritime trade and international relations.

💡 **Fostering Public-Private Partnerships (PPP) in Port Operations:** To improve efficiency and encourage innovation, India should accelerate the adoption of **public-private partnership (PPP) models in port operations.**

- ✦ This approach will not only enhance infrastructure but also drive competition and accountability.
- ✦ By giving the private sector greater stakes in port management and development, the maritime sector can unlock new technologies and processes that improve capacity, reduce costs, and increase operational performance across major ports and terminals.

💡 **Promoting Sustainable and Green Shipping Technologies:** India must incentivize the adoption of green technologies within the maritime sector, focusing on reducing emissions and adopting cleaner fuels such as **hydrogen and biofuels.**

- ✦ Establishing a **national framework for green shipping standards**, offering subsidies for cleaner vessels, and accelerating the implementation of sustainable port infrastructure can ensure compliance with global emission reduction goals.

✦ This would **not only address environmental concerns but also enhance India's position in international trade** by aligning with the global shift towards sustainability.

💡 **Strengthening the Shipbuilding Industry with Innovation:** To position India as a global leader in shipbuilding, it is **crucial to invest in R&D, adopt modern shipbuilding techniques, and improve the capabilities of domestic shipyards.**

- ✦ India should focus on producing technologically advanced vessels, including **electric and hybrid-powered ships, to meet future global demand.**
- ✦ Establishing innovation hubs for maritime technology, expanding skill development programs, and ensuring access to modern machinery will foster indigenous shipbuilding, reduce reliance on foreign shipyards, and enhance the sector's global competitiveness.

💡 **Revamping the Maritime Workforce through Education and Training:** The maritime sector must address the growing skill gap by establishing a national network of training centers focused on maritime engineering, port management, and logistics.

- ✦ Collaborations with **global maritime institutions to develop specialized training programs** will ensure a workforce ready to tackle the challenges of modern shipping and logistics.
- ✦ Additionally, initiatives to **increase female participation in the maritime workforce and enhance the safety and welfare of seafarers should be prioritized**, ensuring that the sector attracts and retains the best talent.

💡 **Establishing Strategic Port Hubs for Transshipment and Trade Facilitation:** India should focus on developing and expanding dedicated transshipment hubs along its coastline to capture a larger share of global maritime trade.

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✦ Ports such as **Vizhinjam and Kandla** can be **developed as international transshipment centers** by offering competitive tariff structures, efficient customs clearance, and integrated logistics services.

✦ These hubs should focus on **increasing cargo handling capacity and providing value-added services like cold storage and bulk handling**, thereby positioning India as a key player in global supply chains.

💡 **Streamlining Maritime Regulations and Red Tape:** To encourage faster growth, India should streamline its maritime regulations by simplifying compliance procedures and cutting unnecessary bureaucratic hurdles.

✦ would make it **easier for international and domestic stakeholders to engage with Indian ports and shipping lines**.

✦ By creating a **single-window clearance system** for maritime permits, licenses, and customs, the government can reduce delays and costs, making the sector more attractive to investors and enhancing India's competitiveness in global trade.

💡 **Strengthening Regional Maritime Cooperation and Trade Agreements:** India should leverage its strategic location by actively engaging in maritime collaborations with neighboring countries to **enhance regional maritime security, improve trade relations, and establish joint port and shipping ventures**.

✦ Strengthening trade agreements with key maritime nations in **Southeast Asia, Africa, and the Middle East** will foster smoother international shipping routes and facilitate trade.

✦ Collaborative initiatives such as **shared port infrastructure, technology exchange, and standardized shipping practices** will further

integrate India into the global maritime ecosystem.

### Conclusion:

India's maritime sector, while progressing with modernization and strategic acquisitions like the Colombo Dockyard, reflects the *Prime Minister's vision that "the maritime sector not only creates and facilitates economic activities; it also connects countries and civilizations."* To fully realize this vision, it is essential for India to reform its maritime sector, securing its position as a global maritime leader and effectively addressing regional challenges.

## The Himalayan Tipping Point

*This editorial is based on "[Himalayan springs are drying. It's a threat to India's ecological stability and national security](#)" which was published in The Indian Express on 03/07/2025. The article brings into picture the escalating ecological crisis in the Indian Himalayan Region, where nearly 50% of springs have dried up. This water scarcity, along with climate change and unsustainable development, forces women in Darjeeling to walk long distances to fetch water.*

**Tag:** GS Paper - 3, Environmental Pollution & Degradation, Environmental Impact Assessment (EIA)

The **Indian Himalayan Region**, known as the "**water tower of South Asia**," faces an escalating ecological crisis as **nearly 50% of its springs are drying up or have already dried**. What was once a region abundant in freshwater now forces **women in Darjeeling villages to walk over an hour each morning to fetch water from failing springs**. Beyond water scarcity, the region grapples with broader ecological challenges including climate change impacts, unsustainable development practices, and the urgent need for comprehensive conservation strategies to protect this ecologically fragile yet strategically vital landscape.

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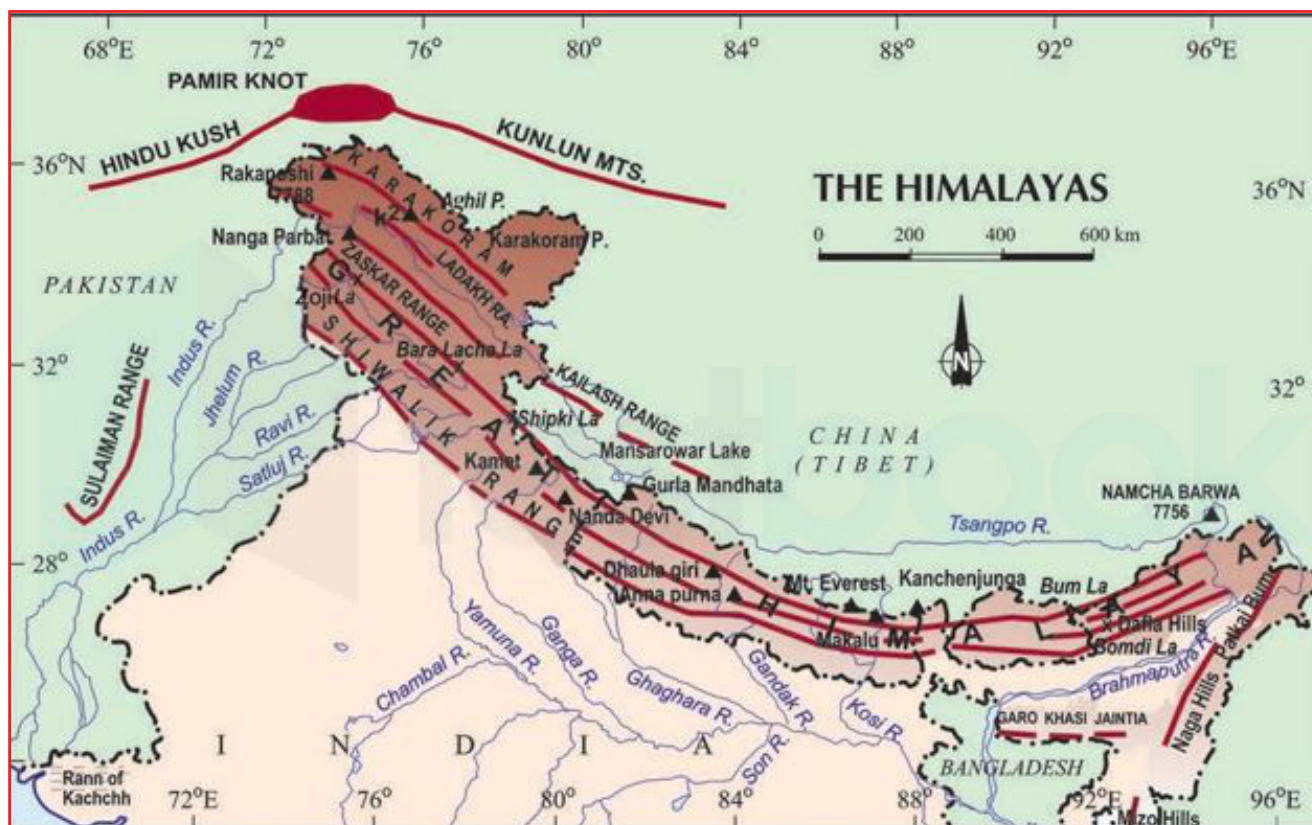


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### What is the Significance of Himalayan Region for India?

- 💡 **Climate Regulation and Monsoon Dynamics:** Acting as a geographical barrier, the range blocks the **southwest monsoon winds**, causing heavy orographic rainfall on the southern slopes, particularly in the **Himalayan foothills and northeastern India**, while creating a rain shadow effect in regions like Tibet and the Thar Desert.
  - ✦ The mountains influence the monsoon onset and intensity, directing moisture-laden winds across the **Gangetic plains and Indo-Gangetic basin, which are vital for agriculture.**
  - ✦ Additionally, the Himalayas block frigid winds from Central Asia, especially Siberia. Without them, India would experience much colder winters, and a significant part of the country could turn into a **cold desert.**
- 💡 **Source of Major Rivers and Freshwater Resources:** The Himalayas are the source of some of India's most important rivers, including the **Ganges, Brahmaputra, and Indus.**
  - ✦ Dams and water reservoirs along these rivers, such as the **Bhakra Nangal Dam on the Sutlej River**, harness the power of fast-flowing Himalayan waters, contributing significantly to India's energy needs.
- 💡 **Ecological Balance and Biodiversity:** The Himalayas, often regarded as the **"ecosystem powerhouse,"** contribute significantly to maintaining ecological balance and fostering biodiversity.
  - ✦ They host unique flora like the **Himalayan blue poppy and medicinal plants such as cordyceps**, while animals like the **snow leopard, Himalayan monal, and red panda** maintain the region's ecosystem.
  - ✦ Species like the **Himalayan tahr and vulture** play important roles in maintaining vegetation and cleaning the environment.
- 💡 **Strategic Defence and Border Security:** The Himalayas play an essential role in securing India's borders, acting as a **natural defence barrier against external threats.**

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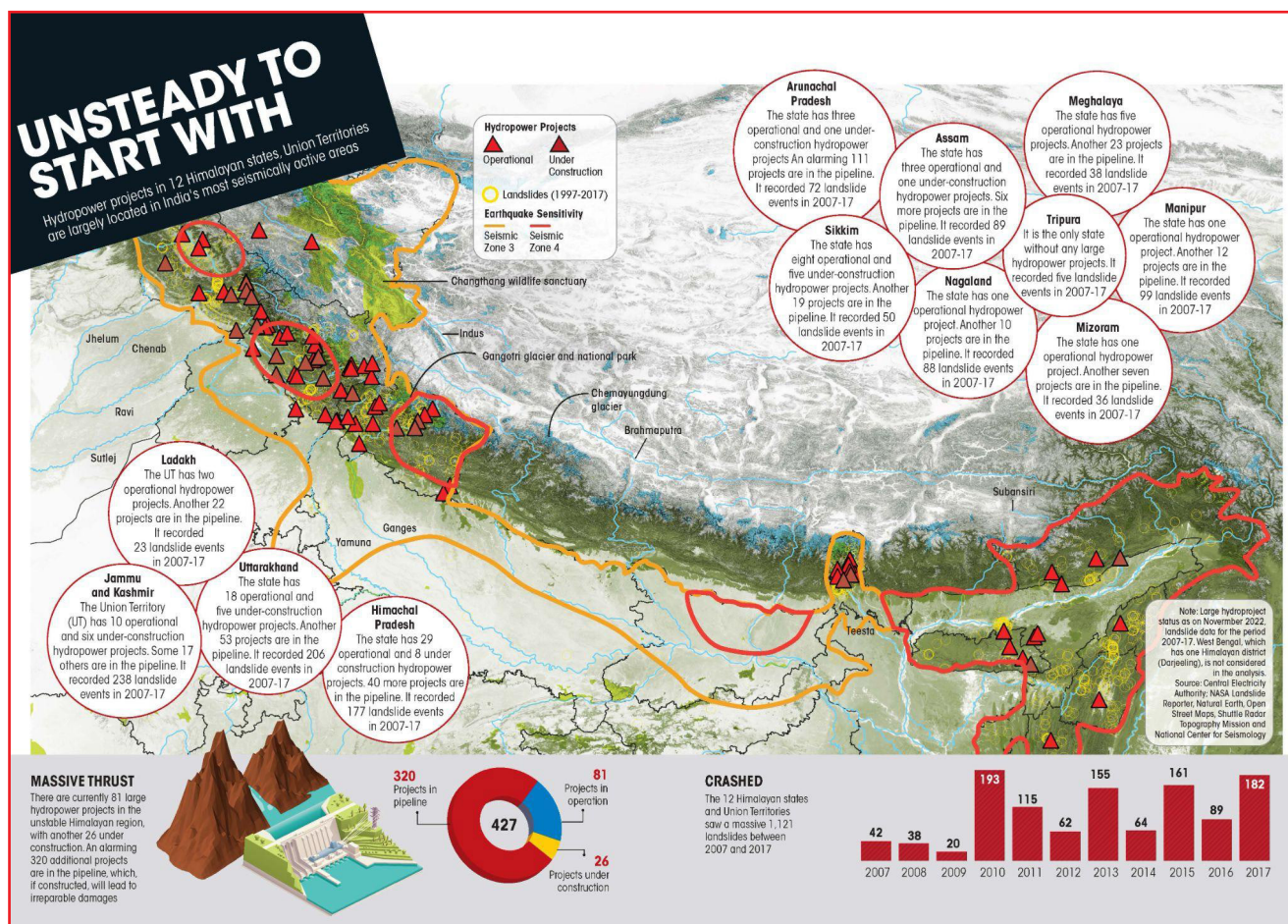


- ✦ The rugged and challenging terrain of the Himalayas impedes offensive operations, making it difficult for adversaries to launch large-scale attacks
- ✦ The region's strategic importance is amplified by ongoing tensions with neighboring countries like **China and Pakistan**.
- ✦ The Indian Army's push for better infrastructure, including the construction of the **Darbuk-Shyok-Daulat Beg Oldie (DSDBO) road**, aims to improve connectivity and operational readiness.

📌 The **Border Roads Organisation** under the Ministry of Defence has built over **60% of roads bordering China** in the last 3 years.

💡 **Hydropower Potential and Economic Development:** The Himalayas are a significant source of hydroelectric power, with untapped potential capable of driving India's renewable energy future.

- ✦ The region houses many of India's most important hydroelectric projects, like the **330 MW Kishanganga Hydroelectric Plant** in Jammu and Kashmir.
- ✦ Government estimates show that the Himalayas, with an installed capacity of 46,850 MW, have a potential to generate **115,550 MW**.



💡 **Livelihoods and Agriculture:** Farmers rely on the seasonal monsoon rains and meltwater from Himalayan glaciers to irrigate crops such as rice, wheat, maize, and barley.

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✦ The diverse **agro-climatic zones**, from the **temperate lower foothills to the alpine meadows**, allow for the cultivation of a wide variety of crops and fruits.

✦ In addition to agriculture, the Himalayas support the livelihoods of millions through activities like pastoralism, where communities raise livestock such as yaks and sheep for **wool, milk, and meat**.

📌 Mountain ecosystems also provide **valuable resources like medicinal plants, herbs, and timber**, which sustain local economies.

💡 **Tourism and Cultural Significance:** The region's majestic beauty is vital parts of the local economy and social fabric. Also, the **Buddhist monasteries and Hindu temples** scattered across the mountains hold deep **religious significance and contribute to cultural tourism**.

✦ The Himalayan region is a major hub for both cultural and eco-tourism, drawing millions annually to sites like **Amarnath, Badrinath, and Kedarnath**.

✦ According to **NITI Aayog**, **tourism contributes over 10% to the Gross State Domestic Product (GSDP)** in states like Uttarakhand, West Bengal, Tripura, and Assam.

### What are the Key Issues Related to the Indian Himalayan Region?

💡 **Water Scarcity and Depletion of Springs:** Water scarcity in the Indian Himalayan Region (IHR) is rapidly escalating, driven by the depletion of freshwater springs that have historically sustained local communities.

✦ According to a **2018 NITI Aayog report**, **nearly 50% of springs in the IHR have already dried up**, with devastating consequences for over 200 million people who depend on these resources.

📌 **Sikkim and Darjeeling** are examples where reduced spring discharge has forced women to walk for over an hour daily to fetch water, disrupting daily life and agriculture.

💡 **Climate Change and Glacial Retreat:** The Himalayas are warming faster than the global average, with significant impacts on the region's glaciers, which are retreating at an alarming rate.

✦ This **glacial melt not only affects water availability for millions but also contributes to unpredictable weather patterns** and extreme events.

✦ Studies indicate that the mean retreat rate of **Hindu Kush Himalayan** glaciers is **14-15 meters annually**. Recent studies also estimate that about **90% of the Himalayan Region will experience drought lasting over a year** if global warming increases by 3°C.

💡 **Deforestation and Ecosystem Degradation:** Deforestation in the IHR threatens biodiversity and accelerates soil erosion, which in turn impacts agriculture and water quality.

✦ The Himalayas are home to rich ecosystems, but unchecked urbanization and illegal logging have caused forest cover to shrink.

✦ A decline of **902 square kilometres** in forest cover was recorded in hill districts of the country (**State of Forest Report, 2021**).

📌 For instance, in Uttarakhand, forests around the **Nanda Devi Biosphere Reserve** have seen illegal logging rise, further destabilizing the region's fragile ecosystem.

💡 **Unsustainable Infrastructure Development and Environmental Stress:** While infrastructure development in the IHR, such as roads, dams, and hydropower plants, is necessary for economic growth, it is leading to significant environmental stress.

✦ Large-scale construction projects, including the **Char Dham Highway** and **hydropower projects**, have weakened the region's geological stability, leading to massive land subsidence.

✦ Recent incidents, such as the **Joshimath land subsidence in 2023**, highlight the **risks associated with overdevelopment in these seismic-prone areas**, where infrastructure

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projects destabilize the region's delicate balance

💡 **Strategic Border Vulnerabilities and Security Concerns:** The IHR holds significant geopolitical importance, particularly with India's borders with China and Pakistan.

✦ With ongoing military standoffs, such as the **2020 Galwan Valley clash** with China and recent terrorist attacks in Jammu and Kashmir like **Pahalagam**, the region's strategic importance is heightened.

✦ In the Ladakh region, the boundary dispute centers around the **Johnson Line proposed by the British in the 1860s**, which placed Aksai Chin within the then princely state of Jammu and Kashmir.

📎 However, **China rejects the Johnson Line and bases its claim on the McDonald Line of the 1890s**, which places Aksai Chin as a point of contention between India and China.

✦ Furthermore, **China's recent new map claims Arunachal Pradesh as part of its territory**, escalating tensions in the region.

💡 **Geopolitical Tensions Over Water Resources:** Water resources in the Himalayas have become a focal point for geopolitical tensions, particularly with neighboring countries like China and Pakistan.

✦ China's recent decision to construct the world's largest dam across the **Yarlung Zangbo-Brahmaputra** raises serious concerns about India's water security.

✦ Additionally, the **Indus Water Treaty**, which governs water-sharing between India and Pakistan, has faced challenges in recent years, with India halting the flow of certain waters to Pakistan in response to escalating tensions and security concerns.

💡 **Tourism Overload and Ecological Damage:** Tourism is a significant contributor to the economy in the IHR, but it is also causing considerable environmental degradation.

✦ Over-tourism, especially in pilgrimage sites like **Kedarnath, Amarnath, and Vaishno Devi**, has led to overcrowding and ecological stress.

✦ For instance, the **Mandakini River in Uttarakhand, particularly near Kedarnath**, faces pollution from untreated sewage and garbage.

📎 Despite directives from the **National Green Tribunal**, local establishments continue to discharge waste into the river, exacerbating water quality issues.

✦ Also, in Himachal Pradesh, the 2023 floods caused significant damage. Studies indicate that **unregulated tourism and construction activities** have contributed to the region's vulnerability to such disasters.

💡 **Uncoordinated Policy Framework and Institutional Gaps:** There is a notable lack of cohesive, long-term policy frameworks addressing the unique challenges of the IHR.

✦ Economic growth, particularly through infrastructure development like roads, dams, and tourism, is often prioritized at the expense of environmental protection and disaster management without adequate **Environmental Impact Assessments**.

✦ For instance, **The Tehri Dam**, while providing hydroelectric power, disrupted local ecosystems, displaced thousands of people, and remains a source of concern due to the region's seismic activity.

### What Measures can India Adopt to Promote Sustainable Development in Himalayan Region?

💡 **Integrated Water Resource Management:** India must adopt a region-specific **Integrated Water Resource Management (IWRM)** approach for the Himalayan region.

✦ This would include the **rejuvenation of springs, management of glaciers, and watershed conservation** through community-led initiatives.

✦ IWRM would prioritize sustainable water use, ensure equitable distribution, and enhance water storage capacity.

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- ✍ This will help in **mitigating water scarcity, preserving traditional knowledge,** and balancing developmental needs with environmental protection.
- 💡 **Sustainable Infrastructure Development:** India should focus on sustainable infrastructure projects tailored to the unique ecological needs of the Himalayan region.
  - ✦ This includes using **environment-friendly construction materials, designing disaster-resistant structures,** and ensuring minimal ecological disruption.
  - ✦ Infrastructure projects must be **evaluated for their environmental as well as social impact before approval,** ensuring that long-term ecological consequences are addressed.
    - ✍ Furthermore, the **construction of eco-friendly roads and buildings should incorporate green technologies** such as solar energy, rainwater harvesting systems, and zero-waste management.
- 💡 **Community-Led Conservation Initiatives:** Local communities in the Himalayan region should be empowered to play a central role in conservation efforts, **creating a bottom-up approach to ecological sustainability.**
  - ✦ This would include training local populations in sustainable agriculture, forest conservation, and eco-tourism.
  - ✦ **Community-led initiatives** can manage **buffer zones around sensitive ecosystems,** such as wildlife sanctuaries and protected forest areas, allowing for better monitoring of illegal activities like poaching and deforestation.
    - ✍ Additionally, indigenous knowledge should be incorporated into conservation strategies, which **would also enhance the socio-cultural fabric of the region.**
- 💡 **Promotion of Green and Renewable Energy:** Encouraging the use of renewable energy sources such as **solar, wind, and small-scale hydropower** will be crucial for promoting sustainable development in the Himalayas.
  - ✦ Solar panels should be installed in remote villages, and micro-hydro projects can be promoted as decentralized, environmentally friendly alternatives to traditional energy sources.
  - ✦ Policies should also be **designed to promote clean energy solutions for industries, agriculture, and tourism.**
- 💡 **Climate-Resilient Agriculture Practices:** India must promote climate-resilient agricultural practices in the Himalayan region, such as **agroforestry, organic farming, and drought-resistant crop varieties.**
  - ✦ The government can **incentivize farmers to adopt practices that improve soil health, enhance water retention, and reduce chemical inputs.**
  - ✦ Additionally, there should be a **focus on developing local markets for organic and eco-friendly produce,** ensuring that sustainable farming becomes economically viable.
    - ✍ Investment in research and extension services to introduce climate-smart farming technologies and diversify agricultural incomes will improve the region's resilience to changing climatic conditions.
- 💡 **Eco-Tourism and Sustainable Tourism Development:** To reduce environmental degradation and generate local income, India should promote eco-tourism as a key strategy for sustainable development in the Himalayas.
  - ✦ This would involve **developing infrastructure and policies that limit overcrowding in sensitive areas** while offering tourists eco-friendly experiences.
  - ✦ Tourism activities should be regulated to ensure that **they do not disturb local wildlife or contribute to excessive waste and pollution.** Establishing community-based eco-tourism ventures will allow local people to directly benefit from tourism while maintaining ecological integrity.

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💡 **Strengthening Disaster Preparedness and Risk Reduction:** Given the region's susceptibility to natural disasters such as landslides, avalanches, and flash floods, India must invest in strengthening disaster preparedness and risk reduction mechanisms.

- ✦ This includes **early-warning systems, disaster-resilient infrastructure, and community-based disaster management strategies.**
- ✦ Training local communities to respond effectively to natural disasters, alongside the integration of climate change projections into disaster management planning, will significantly reduce vulnerability.

💡 **Biodiversity Protection through Eco-Corridors:** Creating ecological corridors in the Himalayan region to connect isolated wildlife habitats is essential for preserving biodiversity.

- ✦ These corridors would **allow for genetic exchange and safe movement of wildlife, reducing human-wildlife conflicts** and improving ecosystem health.
- ✦ Governments and NGOs should collaborate with local communities to ensure that development activities, such as roads or urban expansion, do not fragment these vital corridors.

💡 **Institutional Framework for Himalayan Sustainable Development:** India should establish a dedicated institutional body for the Himalayan region, tasked with overseeing sustainable development initiatives across sectors such as **water, energy, agriculture, and biodiversity.**

- ✦ This body would coordinate efforts among central and state governments, local communities, NGOs, and private sector players to ensure that development is ecologically sustainable.
- ✦ A dedicated body would help in aligning national policies with local realities and ensure long-term sustainability.

💡 **Education and Awareness Campaigns for Sustainability:** There is a critical need to increase awareness of sustainable development practices within local communities and stakeholders across the Himalayan region.

✦ Education campaigns focusing on climate change, biodiversity conservation, sustainable agriculture, and eco-friendly practices should be integrated into school curriculums, community programs, and media outreach.

✦ By raising awareness at the grassroots level, people can make informed decisions that prioritize environmental sustainability over short-term gains.

### Conclusion:

**Himalayas** are vital for India's **3H's: Heritage, Hydrology, and Health.** They sustain culture, water resources, and ecological balance. To protect these invaluable assets amid rising challenges, sustainable policies are crucial. As **John Muir** once said, *"In every walk with nature one receives far more than he seeks."* By protecting the Himalayas, we safeguard not just the environment, but the future of humanity itself.

## Turning Demographics into Development

*This editorial is based on "[Defusing the demographic time-bomb: Tackling the jobs-and-care crisis](#)" which was published in Business Standard on 01/07/2025. The article highlights that India must shift from an industry-led to a community-driven, care-centered model to truly harness its demographic dividend.*

**Tag:** GS Paper - 1, Population and Associated Issues, GS Paper - 2, Human Resource, Skill Development, Health, Poverty, Education, GS Paper - 3, Demographics, Employment, Mobilization of Resources, Inclusive Growth.

The world stands at a **demographic crossroads**, where **youth bulges** and **ageing populations** coexist uneasily within strained economies. With **1.2 billion people** in emerging markets, especially India, seeking jobs, and only **400 million** likely available, the promise of a **demographic dividend** risks turning into a social time bomb. As life expectancy rises and traditional safety nets weaken, India must move beyond industry-led models and embrace **community-centric, care-driven policies** to transform its population challenge into a foundation for **inclusive and sustainable development.**

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## What does the Term 'Demographic Dividend' Mean and What are the Trends?

💡 **UNFPA Definition:** The United Nations Population Fund (UNFPA) defines demographic dividend as growth due to changing age structures.

✦ This occurs when the **working-age population** (15–64) outnumbers the non-working-age population (under 15, over 64).

💡 **Demographic Prime:** India's population has reached its **demographic prime** (a period when a country has a large proportion of its population in the working-age group), with 67.3% of the population aged between **15-59 years**, a demographic advantage expected to persist for another three decades.

✦ This will contribute to India's potential for sustained economic growth and productivity as a young, active workforce drives innovation and development.

💡 **Youthful Population:** Around **26%** of India's population is below 14 years of age, compared to 17% in the US and 21% in Europe.

✦ This demographic trend ensures a future workforce that will support India's economic growth and contribute to its global competitiveness as they mature into working-age adults.

💡 **Elderly Population:** Only 7% of the population is **above 65 years**, significantly lower than the US (17%) and Europe (21%).

✦ A shift from **demographic pyramids** (a large youth population and a smaller elderly population) to **obelisks** (a larger elderly population and a smaller youth population) indicates a rising elderly population globally, including in India.

📌 India's current **youth bulge** presents its most crucial demographic opportunity, enabling a focus on youth development and productivity without the burden of a growing elderly population.

💡 **Future Projections:** By 2030, the working-age population in India will reach 68.9%, with a **median age of 28.4 years** and a **dependency ratio** of just 31.2%.

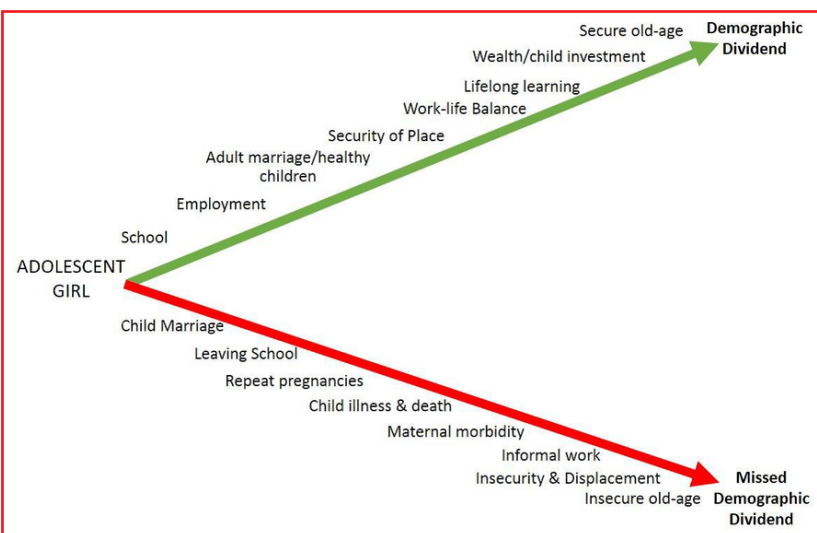
✦ This shift will result in a more **dynamic and productive workforce**, boosting economic output while keeping the dependency ratio at a manageable level.

💡 **Largest Workforce:** India will have the world's largest workforce, with 1.04 billion working-age persons by 2030.

✦ This positions India as a critical global economic player, with a vast labor market capable of driving growth in industries and attracting international investments.

💡 **GDP Impact of the Dividend:** As per McKinsey Global Institute, the dividend contributed **0.7% to GDP per capita growth** in past decades.

✦ However, this is projected to drop to **0.2% annually by 2050**, signalling an urgent need for action.



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## How is India Harnessing Its Demographic Dividend for Growth?

- 💡 **Services-Led Growth Trajectory:** Since the 1990s, India's growth has been **led by services**, especially IT and **digital technology** sectors.
  - ✦ India currently exports **4.6% of global services**, showcasing **skilled labour utilisation** and comparative advantage.
- 💡 **Global Remittance Leadership:** India receives over **\$125 billion in remittances annually**, contributing about **3% of GDP**, exceeding merchandise exports.
  - ✦ Despite this, migrants make up just **1.3% of India's population**, compared to Mexico's 8.6%.
- 💡 **Workforce Expansion and Composition:** India adds **9.7 million potential workers** each year during this decade, increasing global labour supply.
  - ✦ This creates global implications for labour market **supply chains and productivity dynamics**.
- 💡 **Youth-Centric Policy Frameworks:** India's youth-focused policies include **National Youth Policy**, **PM Kaushal Vikas Yojana**, **Startup India**, **Pradhan Mantri Mudra Yojana** and **YUVA Mentorship Scheme**.
  - ✦ These initiatives aim to enhance **aspiration fulfilment**, digital literacy, and **entrepreneurial capacity**.
- 💡 **Gig and Platform Economy Growth:** **Gig workforce** increased from **2.5 million (2011–12)** to nearly **13 million today** and expected to reach 23 million (NITI Aayog).
- 💡 **Education Reforms and Literacy:** Initiatives like **Samagra Shiksha Abhiyan**, and **Right to Education Act** have pushed enrolments and access in primary and secondary education.
- 💡 **Migration as Global Strategy:** India aims to become a **global talent hub**, supplying **medium to high-skilled labour** to aging economies.
  - ✦ Strategic alignment of skills with host countries' demand is supported by **bilateral frameworks and certification reforms**.

- 💡 **Sectoral Diversification for Jobs:** Focus sectors like **tourism, apparel, toys, and logistics** provide job intensity and regional growth balance.
  - ✦ These can integrate under-employed youth into the economy while **upgrading value chains**.
- 💡 **Future-Ready Skilling and AI:** With AI expected to become a **\$826 billion global market by 2030**, India is focusing on future-ready skilling by integrating AI and emerging technologies into education and vocational training programs.
  - ✦ Initiatives like the **National AI Mission** aim to equip the workforce with the necessary skills to thrive in a rapidly evolving digital economy.

## What can Cause a Demographic Disaster in India?

- 💡 **Youth Unemployment Crisis:** According to the **India Employment Report 2024**, youth comprise **83% of India's unemployed population**.
  - ✦ The labour market is failing to **absorb rising entrants**, posing risks of mass underutilisation of human capital.
- 💡 **Skill Development Landscape:** The **India Graduate Skills Index 2025** reveals a concerning decline in employability, with only **42.6% of graduates** deemed employable in 2024, down from 44.3% in 2023.
  - ✦ Skill mismatch continues to challenge **labour absorption**, necessitating curriculum redesign and **job-ready training**.
- 💡 **Education and Learning Deficits:** Only **34% of girls** and **35.9% of boys** (ages 15–24) have completed 12+ years of education (NFHS-5).
  - ✦ According to the **ASER 2024 (Annual Status of Education Report)**, 23.4% of Standard III children in government schools could read Standard II-level text.
  - ✦ Further, **NFHS-5** reveals that only 50.2% of men and 41% of women have completed 10+ years of schooling, highlighting the challenge of improving access to quality education and addressing gender disparities in education.

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💡 **AI Skill Gap Challenge in India:** A significant challenge for India lies in the **51% skill gap** in its AI sector, despite having the world's second-largest AI talent pool.

✦ This gap hinders the full potential of **AI adoption and innovation**, requiring urgent focus on skill development and training initiatives.

💡 **Malnutrition and Cognitive Stunting:** NFHS-5 reports show **35.5% of children under 5 are stunted**, and **67.1% are anaemic**.

✦ Only **11.3% of children (6–23 months)** receive a minimum adequate diet- down from 9.6% in NFHS-4.

💡 **Female Workforce Integration:** The Female Labour Force Participation Rate (FLFPR) in India, as per the **PLFS 2024** annual report, is 41.7%, below the **47% global average**, thus limiting demographic dividend potential.

✦ Barriers include cultural norms, workplace inflexibility, and **limited access to skilling and job security**.

💡 **Informal Employment Trap:** The majority of India's workforce is in the **informal sector**, facing **low wages, no contracts, and no protection**.

✦ This reduces job quality and suppresses the **long-term fiscal and economic gains** of the demographic advantage.

💡 **Poor Working Conditions in Gig Economy:** A 2024 report finds **83% of app-based drivers** work more than **10 hours daily**.

✦ More than **60% work over 12 hours**, violating **ILO's standards on decent work and safety**.

✦ More than **70% of platform workers** say their earnings are **insufficient to meet expenses**.

✦ Precarity, exploitation, and excessive hours **undermine the sustainability** of the youth employment model.

💡 **Shortened Work Life Span:** A study in 2024 found most platform workers exit the workforce by **age 40**, not the typical **retirement age**.

✦ This reduces the **productivity window** and adds to the ageing burden without long-term social security.

💡 **Regional Disparities in Fertility:** States like **Bihar (TFR 2.98)** and **Sikkim (TFR 1.05)** show opposite demographic trajectories.

✦ Without state-specific approaches, India may face simultaneous problems of **overpopulation and depopulation**.

💡 **Ageing Without Preparedness:** By 2030, **193 million Indians** will be elderly, forming **13% of the population**, needing advanced **geriatric care**.

✦ Without planning, the dividend will turn into a **dependency crisis**, increasing health and pension burdens.

### What More Should India Do to Reap the Dividend?

💡 **Reform Education for Relevance:** Only **50.2% of men** and **41% of women (15–49)** have completed 10+ years of schooling (NFHS-5).

✦ Curricula must evolve to embed **digital skills, critical thinking**, and employment-aligned content.

💡 **Expand Skill Matching Ecosystems:** India must create platforms for **international skill certification**, language proficiency, and cross-border placement services.

✦ This aligns with demand in **labour-deficient economies**, improving remittance flow and employment quality.

💡 **Build a Global Talent Hub:** India should pursue a formal **"India for the World" workforce strategy** alongside domestic skilling efforts.

✦ As per MoSPI, India will add **4.2 million workers annually post-2030**, useful for global productivity.

💡 **International Labour Mobility Framework:** Proposed reforms include a **central migration authority**, mutual recognition agreements, and **skill financing mechanisms**.

✦ India can adopt the **Philippines' model** with a central **migration authority, regional offices, and migrant support abroad**, coupled with mutual recognition agreements and skill financing mechanisms.

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- 💡 **Guarantee Labour Rights in Gig Work:** Policy must enforce **working hour limits, wage floors, and healthcare rights** in gig and informal sectors.
  - ✦ Aligning work with **International Labour Organization's (ILO's)** "decent work" norms is vital to sustaining productivity and inclusion.
- 💡 **Invest in Women's Economic Participation:** Provide **job-linked skilling, credit access, and workplace safety** for women to enter **value-added economic activities**.
  - ✦ This can raise household income and **aggregate female contribution to GDP**.
- 💡 **Leverage AI for Digital Skilling:** To address the 51% skill gap in India's AI sector and maximize its potential, the country must prioritize AI-focused skill development programs and align them with global standards.
  - ✦ Collaboration between **government, industry, and academia** can foster innovation, while enhancing AI training initiatives will bridge the gap and drive economic growth.
  - ✦ AI-driven training platforms can address **scale, customisation, and regional accessibility gaps**.
- 💡 **Improve Data for Policy:** Reliable, timely **demographic and labour market data** must inform targeted policy design and tracking mechanisms.
  - ✦ This is critical to **monitor, adjust, and course-correct** India's approach to harnessing its dividend.
- 💡 **Policy Coherence and Multisectoral Alignment:** All ministries must synchronise efforts in **health, education, labour, and external affairs** to optimise outcomes.
  - ✦ The **demographic dividend** is time-sensitive; its policy window narrows with each passing year.
- 💡 **Prioritise Early Nutrition and Health:** NFHS-5 shows **only 11.3% of infants** (6–23 months) receive a minimum adequate diet.
  - ✦ Interventions in early childhood **brain and physical development** are foundational for building cognitive productivity.

## Transforming India's Healthcare System

*This editorial is based on "**When government cares, healthcare makes strides**" which was published in The Hindu on 07/07/2025. The article brings into picture the significant transformation of India's healthcare system over the last 11 years, highlighting the National Health Mission's role in establishing over 1.77 lakh Ayushman Arogya Mandirs.*

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

**India's healthcare system** has undergone a dramatic transformation over the past 11 years, evolving from a system plagued by infrastructure gaps and resource shortages to one focused on comprehensive, accessible care for all citizens. The **National Health Mission** has emerged as the cornerstone of this revolution, establishing over 1.77 lakh **Ayushman Arogya Mandirs** and leveraging digital platforms to democratize healthcare access across the country. This foundation positions **India to achieve its ambitious vision of universal healthcare**, marking a historic shift toward ensuring **affordable, equitable, and quality healthcare** reaches every corner of the nation.

### What is the Current Structure of the Healthcare System in India?

- 💡 **Primary Healthcare:** Primary healthcare serves as the first point of contact for individuals seeking medical attention. It focuses on prevention, health education, and basic health services.
  - ✦ **Governance:**
    - 📎 **State and District Level:** Managed primarily by state governments through district health authorities and local governance bodies such as Panchayats.
    - 📎 **Service Providers:** **Primary Health Centres (PHCs), Sub-Centres, and Health and Wellness Centres (HWCs).**
    - 📎 **Key Areas:** Immunization, maternal and child health, outpatient care, prevention

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of common diseases like malaria, and health education.

- 💡 **Secondary Healthcare:** Secondary healthcare involves specialized medical care usually provided in district hospitals or regional centers.

✦ **Governance:**

- 📎 **State Level:** Managed by state governments via district and regional health authorities. Some specialized hospitals focus on certain conditions.
- 📎 **Service Providers:** District hospitals, Community Health Centres (CHCs), and Specialty Clinics.

- 💡 **Tertiary Healthcare:** Tertiary healthcare offers highly specialized services, usually for complex conditions that require advanced treatment.

✦ **Governance:**

- 📎 **Central and State Governments:** Managed by both central and state ministries. Major institutions such as **AIIMS** and **PGIMER** are under central governance.
- 📎 **Service Providers:** Specialized hospitals, medical colleges, and research institutions.
- 📎 **Key Areas:** Advanced treatment for diseases such as cancer, organ transplants, complex surgeries, and high-end diagnostics.

- 💡 **Regulatory Bodies:** India has multiple regulatory authorities to oversee various aspects of healthcare:

- ✦ **Central Drugs Standard Control Organization (CDSCO):** Regulates drugs, medical devices, and cosmetics in India, ensuring their safety, efficacy, and quality.
- ✦ **Medical Council of India (MCI):** Previously responsible for overseeing medical education and professional practice standards, though it has been replaced by the
- ✦ **National Medical Commission (NMC)** under the National Medical Commission Act, 2019. The NMC now regulates medical education, licensing, and professional ethics.
- ✦ **Pharmacy Council of India (PCI):** Regulates the education and practice of pharmacy in

India, ensuring pharmacists meet required standards.

- ✦ **National Accreditation Board for Hospitals and Healthcare Providers (NABH):** Provides accreditation to hospitals and healthcare providers based on quality and safety standards.

- ✦ **Insurance Regulatory and Development Authority of India (IRDAI):** Regulates health insurance policies and ensures that they are fair and transparent for consumers.

- 💡 **Key Healthcare Policies and Acts:** The Indian government has enacted various laws and policies to regulate healthcare delivery:

- ✦ **The Indian Medical Council Act (1956)** and its successor, **The National Medical Commission Act (2019)**, regulate medical practice and medical education standards.
- ✦ **The Drugs and Cosmetics Act (1940):** Regulates the import, manufacture, distribution, and sale of drugs and cosmetics in India.
- ✦ **Clinical Establishments (Registration and Regulation) Act (2010):** Provides a framework for the registration and regulation of healthcare establishments, ensuring quality healthcare standards in both public and private sectors.
- ✦ **The Indian Nursing Council Act (1947):** Regulates the education and practice of nurses and midwives.
- ✦ **The National Health Policy (2017):** Lays down the roadmap for the healthcare system in India, focusing on providing accessible, affordable, and quality healthcare services to all citizens.

- 💡 **Recent Developments in Healthcare Regulation:** India has made strides in healthcare regulations with the introduction of the **Ayushman Bharat Digital Mission** (ABDM), which aims to create a unified digital health ecosystem.

- ✦ The introduction of **e-pharmacies** is also being regulated by the government to ensure safe and legitimate online medical transactions.

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- ✦ The regulation of telemedicine has also gained traction, with the **Telemedicine Practice Guidelines** released by the **Medical Council of India (MCI)** in 2020.

### What are the Key Issues

#### Associated with Indian Healthcare?

- 💡 **Rural-Urban Healthcare Disparity:** Despite significant strides in healthcare, India's **urban-rural divide** remains a major challenge.

- ✦ The concentration of healthcare infrastructure in urban areas leaves rural populations underserved, with limited access to essential healthcare services.
- ✦ This gap exacerbates health inequities and delays treatment, worsening health outcomes.
- ✦ For example, **rural areas often lack specialists, and the doctor-to-patient ratio in rural areas is much lower**, impacting the quality of care.

📎 In 2022, **over 80% of healthcare professionals** were located in urban areas, while rural regions account for 68% of the population.

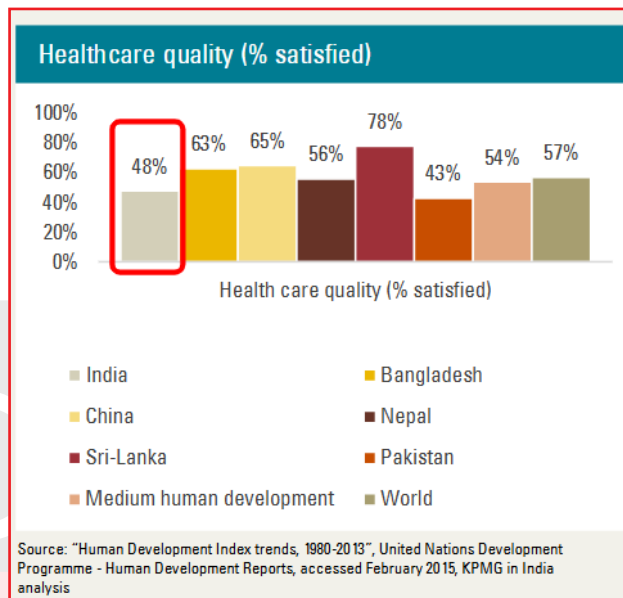
- 💡 **Affordability of Healthcare:** Affordability remains one of the most pressing concerns in India's healthcare system, especially for low-income families.

- ✦ Despite initiatives like **Ayushman Bharat, out-of-pocket expenditure (OOPE)** continues to burden millions, leading to catastrophic health spending.
- 📎 The **fee-for-service model**, where patients pay for services even when insured, intensifies financial strain.
- ✦ In FY23, **India's OOPE was still high at 47.1%**, indicating the ongoing challenge in reducing health costs despite coverage schemes like PM-JAY, which **insured over 10 crore families**.

- 💡 **Quality of Healthcare Services:** Quality of care remains inconsistent across both public and private sectors, further challenging equitable healthcare access. Government hospitals, though affordable, suffer from outdated infrastructure, overcrowding, and staff shortages.

- ✦ Despite improving infrastructure, quality continues to be uneven, undermining patient trust in the public healthcare system.
- ✦ Also in the pharmaceutical sector, **1,394 batches of drugs, valued at more than ₹16.88 crore, were recalled during the FY 2023-24.**

📎 As many as 3,053 drugs were found to be substandard during the financial year 2022-23.



- 💡 **Non-Communicable Diseases (NCDs) Burden:** The rising burden of **non-communicable diseases (NCDs)** like diabetes, cardiovascular diseases, and cancers is another critical issue.

- ✦ With lifestyle changes, India is witnessing an increase in NCDs, affecting both urban and rural populations.
- ✦ An estimated **5.8 million Indians die from NCDs each year**, approximately one in four Indians faces the risk of dying from an NCD before reaching the age of 70.

📎 As per the **NFHS-5 data**, **23% of women and 22.1% of men in India** are overweight as per the BMI criterion, indicating a growing public health crisis.

- 💡 **Underutilization of Public Health Schemes:** Despite government efforts to expand healthcare coverage, schemes like **Ayushman Bharat** still face issues in reach and utilization.

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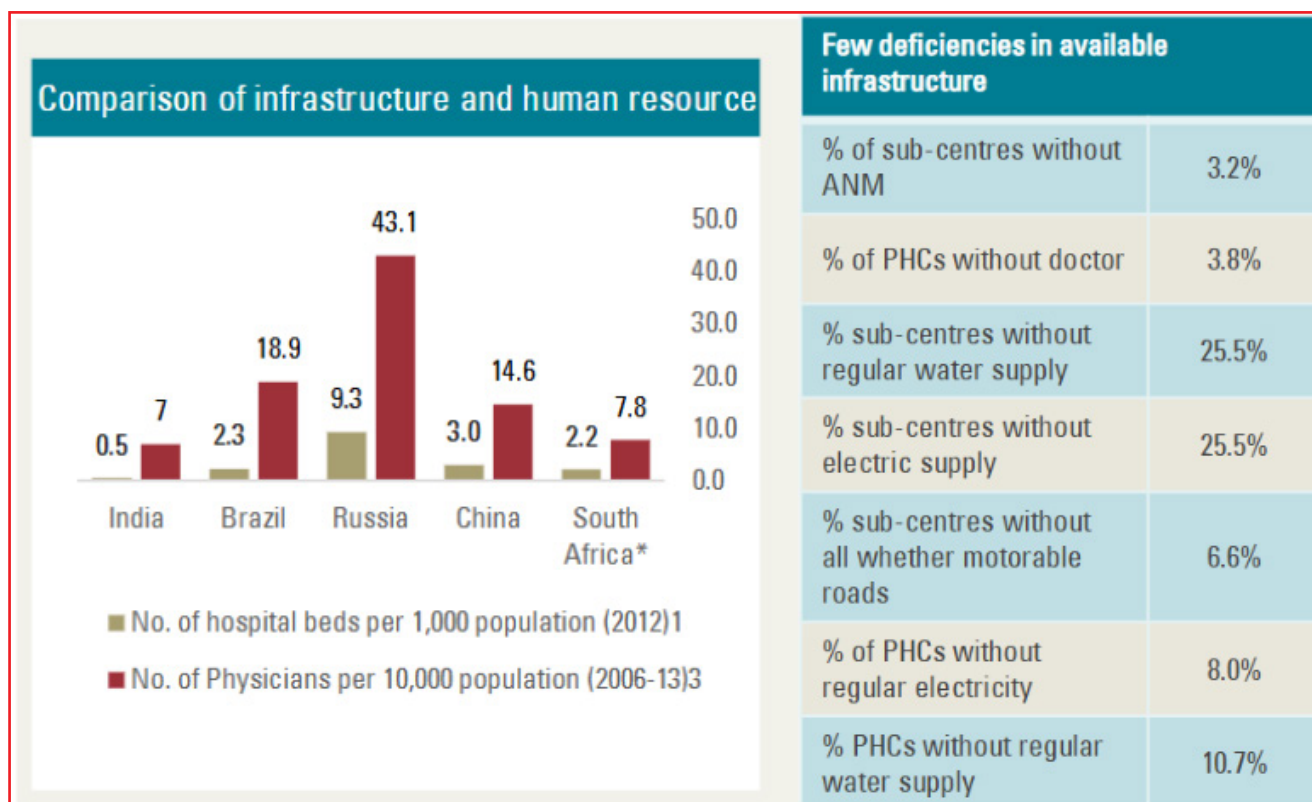
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- ✦ Many eligible individuals in rural and underserved regions are unaware of these programs or face challenges in accessing them.
- ✦ CAG report on the Ayushman Bharat scheme reveals irregularities, including invalid mobile numbers and potential fraud.
  - 📎 The CAG identified 4,761 registrations that were linked to only seven Aadhar numbers, indicating potential irregularities.
- 💡 **Healthcare Infrastructure Gaps:** While there have been improvements in healthcare infrastructure, India still faces major gaps, particularly in remote and underserved areas.
  - ✦ Although more than 1.77 lakh **Ayushman Arogya Mandirs** were established, healthcare facilities remain underdeveloped, with inadequate equipment, personnel, and services.



- 💡 **Health Insurance Penetration:** Although health insurance penetration has increased significantly, millions remain uninsured, especially in the informal sector.
  - ✦ The rise in medical insurance premiums and high out-of-pocket costs for consultations, diagnostics, and drugs continue to hinder access.
  - ✦ Insurance penetration in India is among the lowest in the world. Measured as a ratio of annual premium to the country's gross domestic product (GDP), insurance penetration declined from 4% in 2022-23 to 3.7% in 2023-24, according to the Insurance Regulatory and Development Authority.
- 💡 **Regulation of Private Healthcare Sector:** While private healthcare provides high-quality services, it is largely unregulated, resulting in high costs and inconsistent care.
  - ✦ The absence of strong regulations allows private hospitals to operate with minimal accountability, often charging exorbitant rates for essential services.

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- ✦ India has nearly twice as many private hospitals as public ones and 70% of the population prefer to seek healthcare from private sector hospitals often at hefty charges.

### What Measures can India Adopt to Enhance the Healthcare Sector?

- 💡 **Strengthening Primary Healthcare through Integrated Models:** India must expand and strengthen its primary healthcare infrastructure by promoting an integrated model that combines preventive, curative, and palliative care.

- ✦ This can be achieved by enhancing **Ayushman Bharat Health and Wellness Centres (HWCs)**, ensuring they are equipped with the latest medical technologies and staffed with trained professionals.

- ✦ A more **cohesive primary care system can reduce the strain on secondary and tertiary care hospitals**, ensuring early intervention and reducing long-term healthcare costs.

- 💡 **Accelerating Health Workforce Training and Deployment:** To address the acute shortage of healthcare professionals, India must focus on not only increasing the number of medical schools but also improving training programs to ensure quality healthcare providers across the country.

- ✦ Specialized training for **Community Health Officers (CHOs)** should be ramped up to bridge the gap between primary healthcare workers and medical officers.

- ✦ Additionally, **incentivizing healthcare professionals to serve in underserved rural areas through financial benefits** and career development opportunities could improve the distribution of healthcare workers.

- 💡 **Leveraging Telemedicine and Digital Health Platforms:** Telemedicine and digital health platforms should be fully integrated into the mainstream healthcare system to **provide affordable and accessible care, especially in rural areas**.

- ✦ India can establish a robust telemedicine framework through collaborations with

private and non-profit organizations, while enhancing platforms like eSanjeevani.

- ✦ This would allow for virtual consultations, digital prescriptions, and better management of chronic diseases, while reducing the burden on physical healthcare facilities.

- 💡 **Public-Private Partnerships to Expand Infrastructure:** To close the infrastructure gap, India should increase the use of **public-private partnerships (PPPs) to scale up the construction and maintenance of healthcare facilities**.

- ✦ The government can incentivize private sector investments by offering tax rebates and easing regulations for healthcare providers willing to build in underserved areas.

- ✦ PPPs can enhance the quality of care in district hospitals, establish specialized centers in rural areas, and ensure the availability of advanced medical equipment without relying solely on government funding.

- 💡 **Reforming Health Insurance to Achieve Universal Coverage:** India must expand and reform its health insurance systems to ensure that universal healthcare is accessible to all, including the informal sector.

- ✦ **Simplifying insurance schemes like Ayushman Bharat and expanding their scope to cover outpatient services** and diagnostic procedures would make healthcare more affordable.

- ✦ The government should also focus on **making insurance premiums more affordable and creating awareness about these schemes**, particularly in rural areas where awareness and access remain low.

- 💡 **Emphasizing Preventive and Wellness Care:** Shifting the **focus of healthcare from treatment to prevention is critical**. India should launch nationwide campaigns to raise awareness about lifestyle diseases, encourage regular screenings, and promote healthy habits through digital platforms and local healthcare initiatives.

- ✦ Building a **robust national framework for preventive care through partnerships with schools, communities, and workplaces** would

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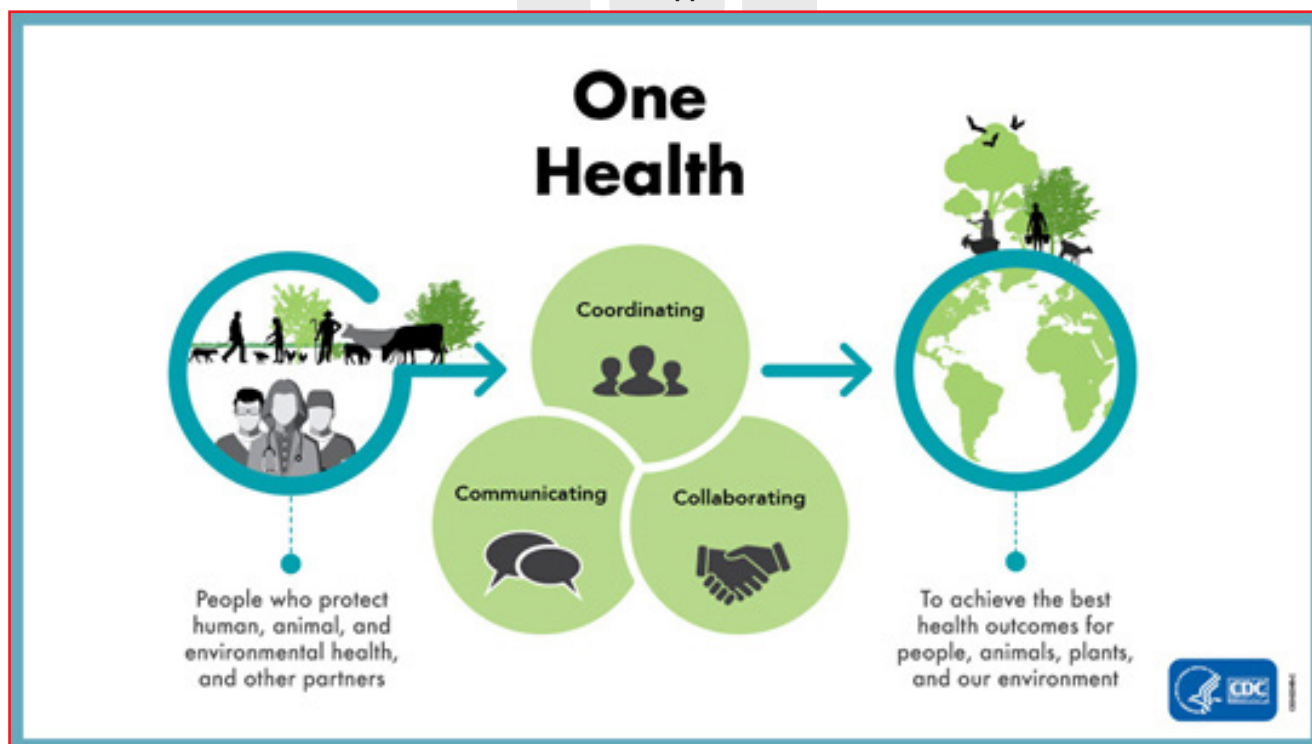


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significantly reduce the burden of non-communicable diseases (NCDs) and lower healthcare costs over the long term.

- 💡 **Strengthening Healthcare Financing Mechanisms:** To ensure sustainable healthcare delivery, India needs to enhance its healthcare financing mechanisms, **targeting an increase in public expenditure on health to at least 2.5% of GDP.**
  - ✦ This could be achieved through **reallocation of existing resources, improving the efficiency of public health spending**, and encouraging private sector contributions through targeted incentives.
  - ✦ Additionally, creating specialized healthcare bonds or setting up healthcare innovation funds could attract investments into the sector, ensuring long-term financial stability.
- 💡 **Improving Regulatory Framework for Private Healthcare:** India must establish a **stronger regulatory framework for the private healthcare sector to ensure transparency, affordability, and quality of care.**
  - ✦ This includes standardizing medical pricing across private institutions, establishing clear guidelines for ethical practices, and regulating the cost of essential services.
- 💡 **Integration of Traditional and Modern Medicine:** India can integrate traditional medicine like **Ayurveda, Homeopathy, and Siddha into the mainstream healthcare system, creating a holistic approach to health.**
  - ✦ By setting standards for these practices and ensuring their integration with modern medical care, the country can offer a broader range of affordable, culturally relevant healthcare options.
  - ✦ This would also alleviate pressure on conventional healthcare systems while preserving India's rich medical heritage.
  - ✦ India should also enhance focus on **One Health Approach.**



- 💡 **Fostering Healthcare Innovation through Startups and Technology:** India should actively foster innovation in healthcare through the creation of incubators and accelerators dedicated to health-tech startups.

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- ✦ Encouraging collaborations between **tech innovators, research institutions, and healthcare providers** can lead to the **development of cost-effective, scalable solutions such as AI-based diagnostics, wearable health devices, and personalized medicine.**
- ✦ Government grants and venture capital funding for these startups will drive the next wave of technological advancements in healthcare, improving access and affordability for all citizens.

#### What India can Learn from Other Countries to Improve its Healthcare Sector?

- 💡 **Universal Healthcare Models (UK):** India can learn from the **UK's National Health Service (NHS)** which provide universal healthcare funded through taxes.
  - ✦ These systems ensure that healthcare is free or low-cost at the point of use, reducing out-of-pocket expenses and promoting equity.
- 💡 **Primary Healthcare Focus (Brazil):** Brazil's Family Health Program has significantly improved access to primary healthcare by deploying community health workers in underserved areas.
  - ✦ India can adopt this approach by strengthening its Health and Wellness Centres (HWCs) and training more Community Health Officers (CHOs) to improve healthcare delivery in rural regions, focusing on prevention and early intervention.
- 💡 **Digital Health Integration (Estonia):** Estonia's advanced digital health infrastructure, including e-health records and telemedicine, offers a streamlined approach to healthcare management.
  - ✦ India can integrate similar digital systems to enhance efficiency, improve patient care coordination, and reduce administrative costs.
  - ✦ Expanding platforms like **eSanjeevani** nationwide could facilitate remote consultations and improve healthcare access.

💡 **Public-Private Partnerships (Singapore):** Singapore has successfully leveraged **public-private partnerships (PPPs)** to build world-class healthcare infrastructure.

- ✦ India can enhance its healthcare system by fostering similar collaborations to expand hospital capacity, modernize facilities, and improve the quality of care, especially in rural and underserved regions.

💡 **Preventive Healthcare Emphasis (Japan):** Japan's focus on **preventive healthcare through regular screenings, health education, and public awareness campaigns** has resulted in high life expectancy and low disease burden.

- ✦ India can adopt a stronger emphasis on prevention by integrating regular health check-ups and awareness programs into its public health initiatives to reduce the burden of **non-communicable diseases (NCDs).**

#### Conclusion:

India's healthcare system is undergoing significant transformation with a focus on universal access, quality care, and digital integration. **Strengthening primary healthcare, expanding insurance coverage, and fostering public-private partnerships** are crucial to bridging these gaps. Aligning these efforts with the **UN's SDG 3 (Good Health and Well-Being)** and the recently released **Global Pandemic Treaty** will be key to ensuring sustainable, equitable healthcare for all.

## India'S Strategic Balance Between Global South and West

*This editorial is based on "**BRICS signals strong Global South, less dependence on West**" which was published in The Indian Express on 08/07/2025. The article brings into picture the BRICS Rio Declaration 2025, highlighting India's role in advocating for Global South representation while balancing its strong economic ties with the West.*

**Tag:** GS Paper - 2, Groupings & Agreements Involving India and/or Affecting India's Interests

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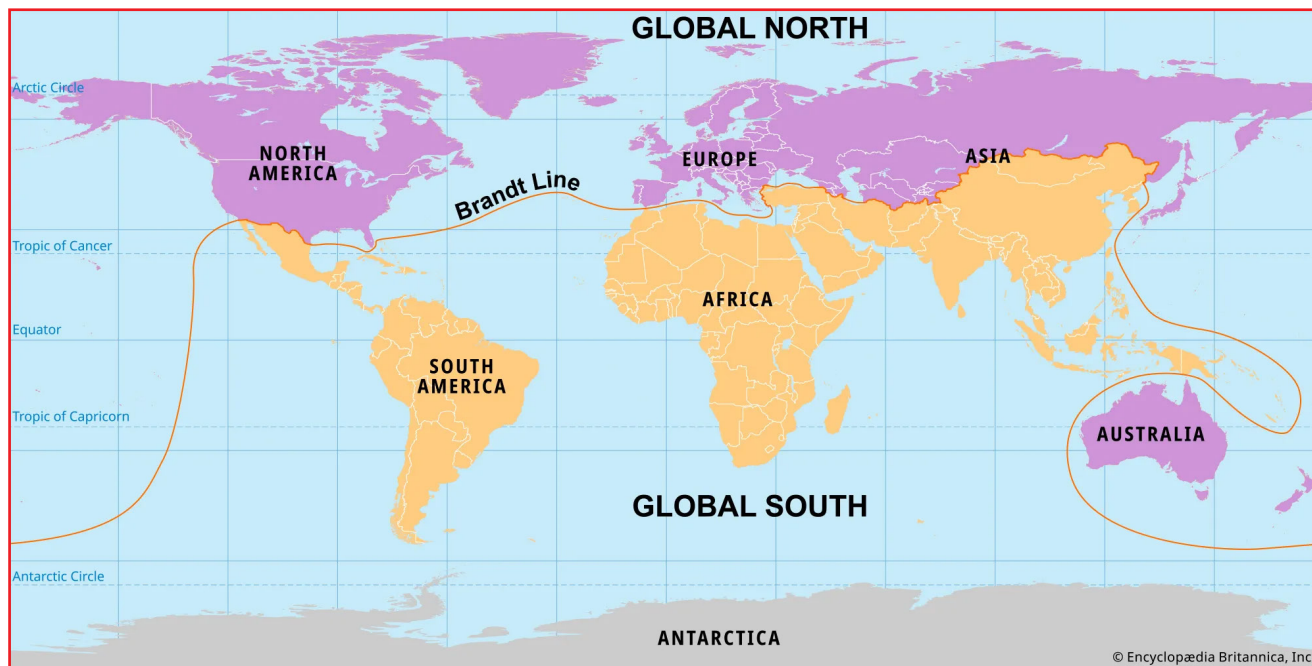
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The **BRICS Rio Declaration 2025** marks a pivotal moment as **emerging economies**, now representing over 40% of the world's population, demand greater representation of the **Global South** in global institutions from the **UN Security Council** to the IMF. India finds itself at the crossroads of this transformation, serving as a **strong advocate for Global South interests** while maintaining **deep economic ties with the West** worth \$130 billion in trade with the US alone. As India prepares to chair **BRICS in 2026**, it faces the delicate challenge of harmonizing its multipolar aspirations with Western partnerships, **positioning itself as a bridge-builder rather than a divider in the emerging global order**.



### What are the Key Factors Driving India's Role as a Leader of the Global South?

- 💡 **Economic Growth and Trade Influence:** India's economic ascent has significantly strengthened its position as a leader in the Global South, driven by robust growth and diversification.
  - ✦ As the **fifth-largest economy globally (potentially the fourth)**, India is a major player in **South-South trade and economic development**, emphasizing its capacity to lead economic initiatives.
  - ✦ **India's trade with the Global South has surged, with trade volumes with Africa increasing from \$5 billion in 2001 to \$90 billion in 2020.**
    - 📎 Also, India was the seventh largest supplier of goods to Latin America with **\$20.22 billion in 2024**, showcasing its expanding economic partnerships.
- 💡 **Diplomatic and Geopolitical Leadership:** India's strategic positioning allows it to serve as a **diplomatic bridge between the Global South and the developed world**, emphasizing multilateralism and global governance reforms.
  - ✦ India actively advocates for the inclusion of emerging economies in major global institutions, such as the UN Security Council, to ensure equitable representation.
  - ✦ During its **G20 presidency in 2023**, India **succeeded in elevating the African Union to a permanent member**, reinforcing its leadership in global decision-making.
    - 📎 **India's role in forums like BRICS and the Quad** further underscores its diplomatic capacity to balance relations with both the Global North and South.

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💡 **Commitment to Sustainable Development:** India's leadership in renewable energy and climate change action has positioned it as a crucial actor in promoting sustainable development within the Global South.

✦ India's initiatives like the International Solar Alliance (ISA) and the National Green Hydrogen Mission showcase its commitment to sustainable growth and energy transition.

✦ As the world's **third-largest producer of wind and solar energy**, India is setting ambitious targets to expand clean energy capacity, aiming to **install 500 GW of non-fossil fuel energy by 2030**.

📌 The country's focus on **green growth supports climate justice and facilitates collaboration among developing nations** on environmental challenges.

💡 **Technological and Digital Innovation:** India's digital transformation, exemplified by innovations like **Aadhaar and UPI**, has cemented its position as a global leader in digital public infrastructure.

✦ India's Digital Public Infrastructure (DPI) model, now being shared with 50 countries, is a case study in how technology can drive inclusive growth.

✦ India's success in expanding financial inclusion through UPI has inspired many nations in the Global South, **with over 12 countries now adopting similar systems**.

📌 This digital revolution enables more equitable access to government services, strengthening India's influence in promoting digital equity globally.

💡 **Humanitarian Leadership and Development Assistance:** India's humanitarian response to crises and its development aid programs reflect its commitment to improving the welfare of the Global South.

✦ India's "Vaccine Maitri" initiative, which provided **COVID-19 vaccines to over 100 countries**, showcased its role as a first responder in global health crises.

✦ India's humanitarian efforts in 2023 include **Operation Dost for earthquake relief in Turkey, Operation Karuna for Cyclone Sitrang in Myanmar, and Operation Kaveri for aid in Sudan**.

📌 India also pledged **\$12.25 billion for development projects in Africa**

💡 **Advocacy for Global South in Multilateral Institutions:** India's persistent advocacy for reforms in multilateral institutions highlights its leadership role in representing the Global South's interests.

✦ **India has called for reforms in the World Bank and IMF** to ensure better representation of developing countries in global economic governance.

✦ India's efforts to reshape the multilateral order were evident during the **2024 Voice of the Global South Summit**, where it proposed a comprehensive **"Global Development Compact"** focusing on trade, capacity-building, and concessional finance.

💡 **Strong Historical and Cultural Ties:** India's historical leadership in post-colonial movements and its cultural diplomacy have played a crucial role in solidifying its leadership within the Global South.

✦ As a founding member of the **Non-Aligned Movement (NAM)**, India's role in advocating for **sovereignty and self-determination for newly independent nations** has endured into the present (even with **Palestine**).

✦ India continues to engage in cultural diplomacy through initiatives like the Indian Council for Cultural Relations (ICCR), which strengthens ties with **Africa, Latin America, and Southeast Asia**.

📌 These cultural exchanges foster deeper solidarity and mutual understanding, reinforcing India's status as a moral and diplomatic leader.

💡 **Resilient Foreign Policy with Strategic Autonomy:** India's foreign policy, characterized by strategic autonomy, enables it to navigate complex geopolitical dynamics while leading the Global South.

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- ✦ Unlike China, which pursues an aggressive economic diplomacy, India maintains a balanced approach, fostering relations with both the West and the Global South.
- ✦ India's neutral stance on conflicts like the **Russia-Ukraine war** has enabled it to strengthen ties with Russia while enhancing strategic partnerships with Western powers.
  - 📌 India's foreign policy flexibility, coupled with its economic prowess, ensures it remains a strong voice for the Global South in shaping global policies.

### What are the Key Hurdles for India in Managing Aspirations of the Global South with Its Western Aspirations?

- 💡 **Balancing Strategic Autonomy with Western Engagement:** India's pursuit of strategic autonomy often puts it in a difficult position, as it seeks to balance its deepening ties with Western countries while maintaining solidarity with the Global South.
  - ✦ India has avoided subscription to formal security alliances, such as **NATO** as part of its non-alignment stance, but its growing ties with the US and Europe sometimes clash with its leadership in the Global South.
  - ✦ For example, India's decision to abstain from voting on the Russia-Ukraine war in the UN highlights the delicate diplomacy balancing Western expectations and Global South solidarity.
- 💡 **Economic Dependencies on the West vs. South-South Cooperation:** India's trade and economic ties with Western countries remain robust, with the US alone accounting for \$130 billion in bilateral trade, yet India's growing role in South-South cooperation demands a shift toward self-reliance and equitable partnerships.
  - ✦ India's trade with Africa has risen from \$5 billion in 2001 to \$90 billion in 2020, but its trade dependency on the West remains high. The challenge lies in mitigating the economic leverage of the West while advancing Global South interests.

- 💡 **Confronting Geopolitical Tensions with China and the West:** India's geographical proximity to China and its territorial disputes complicate its diplomatic efforts to act as a neutral bridge between the Global South and the West.
  - ✦ While India strengthens its ties with the **US-led Quad to counter China's influence in the Indo-Pacific**, this has strained its diplomatic ties with Beijing, which is a significant partner to the Global South.
  - ✦ On the other hand, **China's development initiatives in the Global South, often facilitated through the Belt and Road Initiative (BRI)** have led to significant infrastructure projects and economic partnerships that has caused concerns to India.
- 💡 **Competing Sustainability Models: Green Growth vs. Western Pressures:** India's green growth strategy (**phase down of coal sector rather than phase out**), is at odds with Western pressure to meet stringent environmental standards while promoting industrial growth.
  - ✦ While India and the countries of Global south, aims to balance economic growth with climate goals, they face criticism from the West for their reliance on coal, a key part of its energy mix.
  - ✦ India's target to expand non-fossil fuel energy to 500 GW by 2030 showcases its commitment, but its increasing coal usage—**over 70% of India's energy needs are met through coal**—adds complexity to its climate diplomacy.
    - 📌 This creates friction with both the West and the Global South, which expects faster climate justice.
- 💡 **Domestic Socio-Political Disparities vs. Global Leadership:** India's domestic socio-political challenges, particularly concerning inequality, poverty, and communal tensions, **undermine its credibility as a leading voice for the Global South on the world stage.**
  - ✦ While India champions equitable global governance and South-South cooperation, its internal struggles with economic disparity, as

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seen in the Oxfam India report (2021) showing that **India's richest 1% hold more than four-times the wealth held by 953 million people** who make up for the bottom 70 per cent of the country's population.

- ✦ India's global advocacy for poverty alleviation faces pushback when its own social development indicators show stagnation, challenging its moral authority in international forums.

💡 **Climate Change vs. Western Financial Commitments:** India's climate action strategy faces hurdles due to **Western countries' failure to meet their financial commitments to developing nations**, particularly in addressing climate change.

- ✦ India's leadership in climate justice through the ISA and its own ambitious renewable energy targets are **undermined by the lack of adequate funding from the Global North**.
- ✦ Despite its commitment to the **Paris Agreement**, India and the global south continues to face funding gaps.

📌 India's own renewable energy capacity is **growing**, but the lack of global financial support for these initiatives exacerbates the divide between India's green goals and Western promises.

### What Measures can India Adopt to Balance Global South Leadership with Western Engagement?

💡 **Strategic Multi-Alignment in Foreign Policy:** India should continue its policy of strategic multi-alignment, where it doesn't commit to any single bloc but maintains active engagement across multiple fronts—**Global South, BRICS, G20, and partnerships with the West**.

- ✦ This approach ensures that India remains flexible, leveraging its position to advocate for South-South cooperation without alienating key Western allies.

- ✦ By navigating these relationships like a **"thali and not a bowl"** India can harmonize its diverse interests, much like how different elements complement each other on the same plate, as noted by Shashi Tharoor.

📌 India's diplomacy can thus remain inclusive while asserting leadership for the Global South in forums like the UN and G20.

💡 **Strengthening South-South Cooperation through Technical and Developmental Leadership:** India should enhance its role as a development partner by prioritizing capacity-building initiatives and technical assistance to the Global South.

- ✦ This would involve a **deepening of South-South cooperation**, ensuring that India provides practical solutions in sectors like renewable energy, healthcare, and digital infrastructure.

- ✦ The promotion of technology transfer and knowledge sharing, while emphasizing India's democratic values and development experience, would enhance its moral authority as a bridge-builder between the Global South and Western powers.

💡 **Promoting Global South Representation in Multilateral Institutions:** India can further advocate for the reform of global institutions like the **UN Security Council and the IMF**, pushing for more equitable representation for the Global South.

- ✦ By combining its role as a leading voice for emerging economies with pragmatic alliances with Western powers, India can position itself as a catalyst for reform, ensuring that the interests of the Global South are considered in the global governance structures without antagonizing the West.
- ✦ This would **require India to balance critique with constructive engagement**, aiming for a more inclusive multilateral system.

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💡 **Inclusive Climate Diplomacy to Bridge Development and Sustainability:** India should lead the charge in bridging the divide between development and sustainability by advocating for climate justice **while ensuring that the economic growth aspirations of the Global South are met.**

- ✦ By emphasizing inclusive climate diplomacy, India can push for equitable financing from the West, **while also positioning itself as a leader in green technologies for emerging economies.**
- ✦ This approach allows India to assert its leadership on climate change in a manner that resonates with the Global South, while also collaborating with Western nations to meet global environmental goals.

💡 **Leveraging Technology for Digital Sovereignty and Global Partnerships:** India should take the lead in building digital infrastructure for the Global South while advancing its own technological sovereignty.

- ✦ By promoting **India's Digital Public Infrastructure (DPI) model globally**, India can provide solutions that enhance connectivity, financial inclusion, and governance, particularly in underdeveloped regions.
- ✦ This would not **only solidify its role as a technology leader but also create a platform for dialogue with the West**, balancing its tech aspirations with its leadership in the Global South.

💡 **Enhanced Defense and Security Cooperation with Global South and the West:** India can increase its role in global peace and security by promoting defense and security cooperation **both within the Global South and with Western powers**, thereby fostering stability in critical regions like the Indo-Pacific and Africa.

- ✦ This would involve deepening defense ties with the US and European nations while promoting peace-building and conflict resolution within the Global South, **positioning India as a regional security provider.**

💡 **Fostering Cross-Cultural Diplomacy for Soft Power Expansion:** India's cultural diplomacy should be strengthened to create bridges between the Global South and the West, with a focus on **promoting shared values of democracy, pluralism, and mutual respect.**

- ✦ This approach would see India using its cultural assets—such as Bollywood, yoga, and its rich heritage—to **enhance people-to-people ties, while also fostering stronger economic and educational exchanges.**
- ✦ By positioning itself as a cultural ambassador for both the Global South and the West, India can play a central role in shaping global perceptions and creating common ground for collaboration.

💡 **Enhancing Trade and Investment Partnerships with a Global Framework:** India should develop a **comprehensive, inclusive trade and investment framework that balances the needs of the Global South with the demands of Western markets.**

- ✦ This could involve advocating for fairer trade agreements that ensure mutual benefits, address developmental challenges, and promote sustainable growth.
- ✦ By taking the **lead in creating a global economic architecture that respects both the Global South's developmental goals and the West's market-oriented approach**, India can position itself as a key player in global trade negotiations.

### Conclusion:

In navigating its leadership role in the Global South while maintaining strategic engagement with the West, **India must balance multiple global relationships with finesse.** As India's External Affairs Minister Dr. S Jaishankar aptly puts it, *"This is a time for us to engage America, manage China, cultivate Europe, reassure Russia, bring Japan into play, draw neighbours in, extend the neighbourhood and expand traditional constituencies*

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*of support.”* By leveraging its diplomatic agility, India can position itself as a bridge between diverse global interests, ensuring a more inclusive and equitable world order.

## From Relief to Resilience in Disaster Management

*This editorial is based on “[India’s disaster risk financing needs to evolve as new options emerge](#)” which was published in The Livemint on 08/05/2024. The article brings into picture the fundamental paradox in India’s disaster management framework: despite successive Finance Commissions strengthening funding mechanisms, the country’s vulnerabilities continue to escalate.*

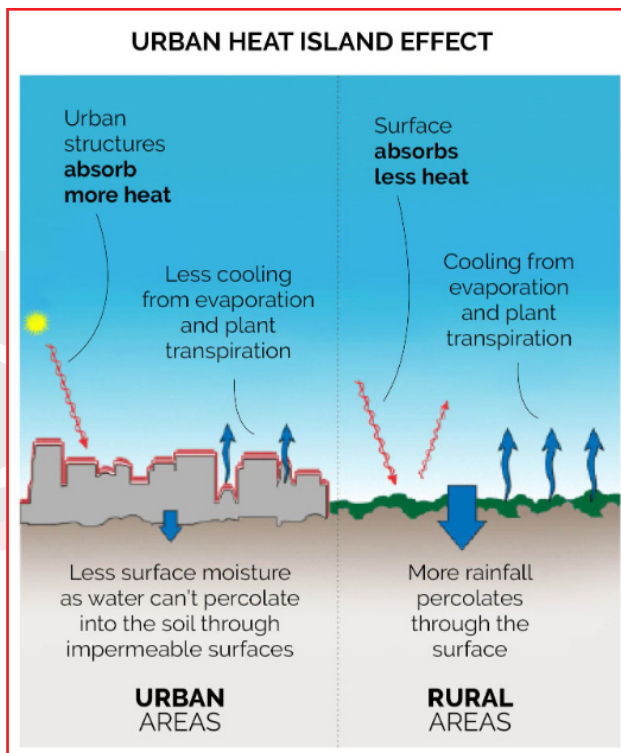
**Tag:** GS Paper - 2, Important International Institutions, GS Paper - 3, Disaster Management, Environmental Impact Assessment (EIA), Environmental Pollution & Degradation

India’s disaster management framework faces a fundamental paradox: while successive Finance Commissions have strengthened funding mechanisms, the country’s vulnerabilities continue to escalate, with **economic losses from disasters now exceeding ₹50,000 crore annually**. The devastating impact of recent cyclones like **Amphan** and **Tauktae**, floods across Bengaluru, Assam and Chennai, and landslides in Wayanad underscore how disasters crash into lives and economies with alarming regularity. The question is no longer whether India can afford to invest in disaster preparedness, but whether it can **afford not to fundamentally reimagine its approach to building resilience against an increasingly unpredictable climate future**.

### What are the Key Disaster Threats India is Facing?

- 🔦 **Extreme Heatwaves and Urban Heat Island Effect:** India is facing escalating heatwaves due to climate change, exacerbated in cities by the **Urban Heat Island effect**.

- ✦ Poor infrastructure, lack of green cover, and reflective surfaces make urban centers deadly during summer. It also disproportionately affects the elderly, outdoor workers, and slum populations.
- ✦ In 2024, Delhi recorded 49.9°C. IMD noted a notable rise in heatwave days between 2000–2020 across north India.



- 🔦 **Glacial Melts and Himalayan Flooding:** Accelerated glacial melt in the Himalayas due to **global warming** is triggering **flash floods and landslides**. These events are made worse by rampant hydro-projects and deforestation in fragile zones.
- ✦ The threat is transboundary, impacting Nepal, Bhutan, and northern Indian states alike.
- ✦ The **2023 Sikkim flood killed 74 after a glacial lake burst**. ISRO found 2,000+ Himalayan glacial lakes at high risk.

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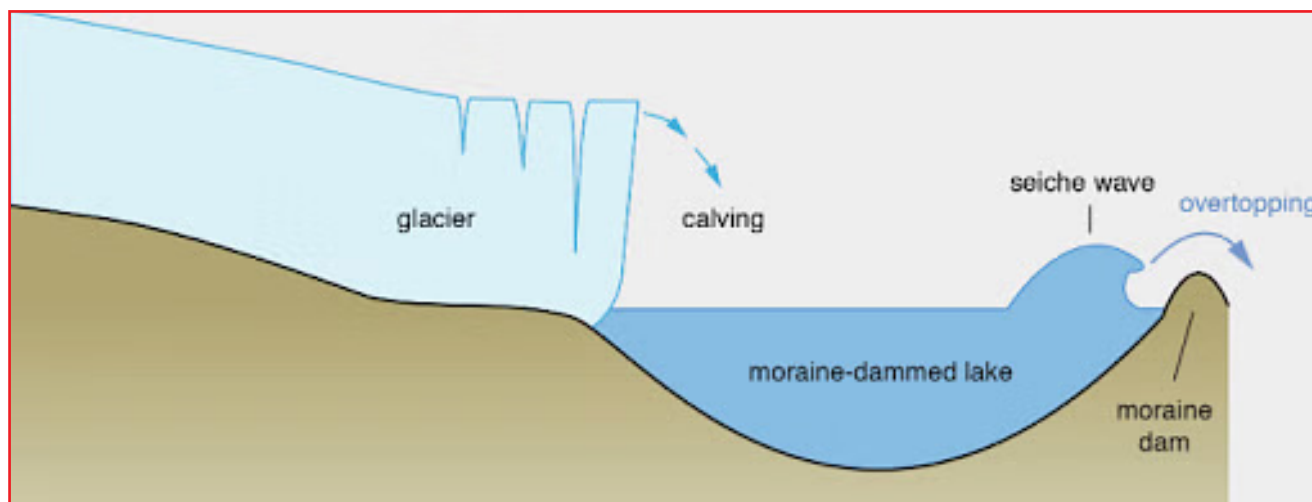


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💡 **Cyclones Intensifying in Arabian Sea:** Cyclones are increasing in frequency and severity in the Arabian Sea, a new shift historically rare for India's west coast. Warming oceans are energizing storms, endangering coastal states like Gujarat, Maharashtra, and Kerala.

✦ **Urban coastal populations and port economies are highly vulnerable.** Cyclone Biparjoy (2023) was the longest Arabian Sea cyclone, displacing 94,000 people in Gujarat.

■ Maximum intensity of cyclones has increased 40%, from **100 km/hour to 140 km/hour**, in the Arabian Sea during the pre-monsoon (April–May) season

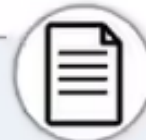
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■ In the north Indian Ocean, **every 4th cyclone in the pre-monsoon season intensifies to a severe cyclone of category 3 or more** (wind speed over 175 km per hour)

■ During the post-monsoon (October–December) season, the Arabian Sea has witnessed a 20% increase in the intensity of cyclones, from **100 km/hour to 120 km/hour**

■ Every 7th cyclone in post-monsoon season intensifies to a **severe cyclone of category 3 or more**



💡 **Flooding and Urban Drainage Collapse:** Monsoons now frequently cause urban floods due to poor drainage, encroachments, and infrastructure failure. Rapid unplanned urbanization worsens impermeability and waterlogging. Climate variability leads to short, high-intensity rains overwhelming systems.

✦ In July 2023, Delhi saw Yamuna reach its highest level in 45 years, inundating key areas.

💡 **Earthquake Risk in the Himalayan Belt and Northeast:** Seismic risk remains under-addressed in India's north and northeast, both in high seismic zones. Poor enforcement of building codes and informal construction increase

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vulnerability. The region is overdue for a major quake, experts warn.

- ✦ **Over 58% of Indian land is earthquake-prone (NDMA).** In March 2024, a 6.6 magnitude quake in Afghanistan shook Delhi, highlighting transboundary seismic risk.

💡 **Water Scarcity and Droughts:** Over-extraction, monsoon variability, and inefficient agriculture are deepening India's water crisis. Central and southern states are increasingly drought-prone, with declining groundwater tables. The crisis has socio-economic and interstate conflict dimensions.

- ✦ **Over 70% of India's groundwater is overdrawn (CWC, 2023).** Marathwada saw 8 consecutive drought years; Karnataka-Tamil Nadu Cauvery dispute flared again in 2023.

💡 **Forest Fires and Biodiversity Loss:** Rising temperatures and dry spells are increasing forest fire frequency in ecologically sensitive zones. Poor forest management, human activity, and invasive species intensify the problem. These fires threaten biodiversity, tribal livelihoods, and carbon sinks.

- ✦ **In 2024, Uttarakhand saw major forest fire incidents in 4 months.** FSI reported a notable increase in vulnerable fire-prone areas compared to 2004.

💡 **Sea Level Rise and Coastal Erosion:** India's 7,500 km coastline is under threat from rising sea levels, leading to saline intrusion and land loss. Coastal livelihoods, ports, and tourism are at stake. Mangrove destruction and sand mining worsen natural defenses.

- ✦ **Chilika Lake has experienced a remarkably high erosion rate of 19.87 meters per year.** Sundarbans islands are sinking 2–3 mm annually.

### What Makes India's Existing Disaster Management System Inadequate for Modern Disaster Challenges?

💡 **Legacy Framework Focused on Relief, Not Resilience:** India's disaster response remains reactive—focused on post-disaster relief, not risk reduction or resilience building. Structural

mitigation, early warnings, and climate adaptation are still underemphasized.

- ✦ **NDMA lacks binding enforcement authority and strategic agility.** Cyclone Amphan (2020) caused \$13B damage despite early warnings—pointing to poor structural readiness.

💡 **Inadequate Local Governance and Decentralization:** Disaster planning is top-down; local bodies lack funds, autonomy, and technical capacity to respond.

- ✦ Gram Panchayats and ULBs are poorly integrated into risk planning. This limits real-time response, especially in rural and peri-urban India.
- ✦ Less than 10% of districts have updated disaster management plans (NDMA, 2024). In 2023, many villages in Himachal faced landslides without local evacuation protocols.

💡 **Poor Integration of Climate Science into Risk Planning:** The DM framework ignores shifting baselines—like increased glacial floods or urban heatwaves—driven by climate change. Risk assessments use historical, not dynamic or predictive, data. Climate variability is treated as episodic, not systemic.

- ✦ **Uttarakhand floods (2023)** highlighted failure to anticipate glacial lake outburst risk zones.

💡 **Urban Fragility and Infrastructure Collapse:** Rapid urbanization outpaces the disaster management system's capacity to handle infrastructure failure. Drainage, power grids, healthcare and transport systems are highly brittle in metros.

- ✦ Urban floods, fires, and building collapses are becoming chronic.
- ✦ **For instance, Bengaluru floods (2022) affected ₹225 crores in losses to IT companies.**

💡 **Technology Gaps in Forecasting and Early Warning Systems:** India's early warning systems lack granularity, real-time dissemination, and last-mile delivery. Forecasting does not cover non-cyclonic events like heatwaves, forest fires, and flash floods adequately. Multi-hazard systems remain fragmented.

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✦ Heatwave alerts cover only a few states despite 23 being vulnerable (IMD, 2024).

💡 **Fragile Critical Supply Chains and Interdependencies:** Disasters now disrupt national food, fuel, and digital supply chains due to high interconnectivity. Current frameworks do not assess cascading risks across sectors. A localized event can now trigger multi-sectoral breakdowns.

✦ **During Cyclone Biparjoy (2023),** Kandla Port disruption impacted fertilizer logistics.

💡 **Underfunded and Incoherent Institutional Architecture:** NDMA, SDMAs, and DDMA remain under-resourced, overlapping, and poorly coordinated. Their mandates often clash with development authorities and ministries.

✦ Disaster management is not mainstreamed into regular governance.

✦ Also, Private industries and communities are marginal in current planning—despite their exposure to risk and potential for resilience. CSR is rarely directed toward risk reduction. Communities lack training, drills, or decision-making power.

### What Measures Can India Implement to Build a More Robust Disaster Resilience System?

💡 **Institutionalize Climate-Risk Mainstreaming in Urban and Infrastructure Planning:** India must embed dynamic climate-risk indices into smart city, housing, transport, and energy infrastructure policy.

✦ This includes zoning reforms, resilience benchmarks in urban bylaws, and climate-proofed master plans.

✦ Spatial planning should integrate predictive hazard mapping, not just historical vulnerability. Urban planning must shift from expansionist to climate-adaptive design.

💡 **Establish Decentralized Multi-Hazard Risk Mapping and Action Cells:** Every district must host a real-time multi-hazard monitoring cell equipped with AI-driven predictive tools, GIS layers, and local contingency protocols.

✦ These units should coordinate with Panchayats and city wards for last-mile action. Risk mapping should cover compound events like floods plus epidemics or earthquakes plus fires.

💡 **Build a National Resilience Fund with Dedicated Capex for Mitigation:** Instead of reactive relief budgets, India must earmark a capital expenditure-driven “National Resilience Fund.”

✦ This should finance embankments, retrofitting, natural buffers, green infrastructure, and early warning infrastructure. A rules-based fund disbursement mechanism linked to performance metrics should guide usage.

💡 **Codify a Disaster-Resilient Infrastructure Code for All Sectors:** Develop a mandatory “Disaster Resilient Infrastructure Code” applicable to railways, power grids, ports, schools, and telecom.

✦ All public infrastructure should be designed or retrofitted to withstand specific local risks like seismic loads, floods, or cyclonic winds. It must be legally binding and audited annually.

💡 **Create Risk-Sensitive Financial Instruments and Insurance Ecosystems:** Develop scalable parametric insurance models for droughts, floods, cyclones, and crop loss, especially for MSMEs, farmers, and informal workers.

✦ Link microfinance and risk-pooling mechanisms with local cooperatives. Encourage banks and FPOs to offer resilience-linked credit to high-risk zones.

💡 **Institutionalize Community-Led Early Warning and Response Protocols:** Promote “Risk Committees” in every village and urban slum to design, drill, and execute response protocols based on local knowledge.

✦ Equip them with basic digital tools and rapid-response kits. Empower women, SHGs, and youth collectives as first responders through routine capacity building.

💡 **Integrate Disaster Resilience into Public Health Systems:** Redesign primary healthcare centers (PHCs) as climate-resilient units with surge capacity

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for floods, heatwaves, or vector outbreaks. Embed health surveillance, mobile medical units, and telemedicine into district disaster plans.

- ✦ Align state disaster authorities with the National Health Mission for hazard-health convergence.

💡 **Institutionalize Disaster Risk Education in Curriculum and Workforce Training:** Make disaster preparedness and climate resilience part of formal school curricula, vocational training, and civil services modules.

- ✦ Public-sector employees, teachers, contractors, and panchayat workers must be trained in localized emergency handling. Use simulations, drills, and gamified e-learning platforms.

💡 **Legally Mandate Private Sector Continuity Planning and CSR Risk Financing:** Make it compulsory for industries, SEZs, and corporate clusters to maintain “Business Continuity and Resilience Plans.”

- ✦ CSR regulations must prioritize disaster preparedness and ecosystem restoration in vulnerable zones. Set up a joint public-private emergency response financing mechanism.

💡 **Restore and Protect Natural Buffers Through Eco-DRR Models:** Adopt **ecosystem-based disaster risk reduction (Eco-DRR)** by restoring mangroves, floodplains, wetlands, and forest corridors.

- ✦ Use nature-based solutions for slope stabilization, urban cooling, and water absorption. Institutionalize green buffers into land use plans and link them to carbon-credit finance streams.

💡 **Build a National Cadre of Climate and Disaster Professionals:** Establish a specialized service—like a “**Disaster and Resilience Services Cadre**”—with domain experts in geoinformatics, urban risk, humanitarian logistics, climate adaptation, and emergency medicine.

- ✦ Rotate them across SDMAs, research agencies, and ground deployments for rapid professionalization.

## Conclusion:

To build a disaster-resilient India, the current reactive framework must evolve into a proactive, climate-smart, and locally-empowered system. Integrating technology, equity, and ecosystem-based strategies is no longer optional—it’s urgent. Disaster risk reduction must be mainstreamed across all sectors, not siloed as an emergency response. This aligns squarely with the **Sendai Framework’s** priorities: **risk understanding, governance, resilience investment, and preparedness** for “**Build Back Better**.”

## Strengthening India’s Innovation Landscape

*This editorial is based on “**Innovation needs State as much as the private sector**” which was published in The Hindustan Times on 10/07/2025. The article brings into picture the essential collaboration between state and private sector in driving India’s innovation ecosystem, with recent policies in semiconductors, space, and renewable energy highlighting this successful partnership.*

**Tag:** GS Paper - 2, Government Policies & Interventions, Issues Relating to Development, GS Paper - 3, Growth & Development

**India’s innovation trajectory** has long been driven by a false dichotomy between state-led and private sector approaches, when in reality **both are essential partners in building a robust ecosystem**. While private enterprise brings **agility, risk-taking capacity, and market responsiveness**, the state provides **critical infrastructure, regulatory frameworks, and patient capital for long-term research**. The most successful innovation hubs globally demonstrate that strategic government intervention complements rather than competes with private innovation. India’s recent policy initiatives in **semiconductor manufacturing, space technology, and renewable energy** illustrate this collaborative model in action.

## What are the Key Strides in India’s Innovation Ecosystem?

💡 **Government Led:**

- ✦ **Strategic Government Policies and Schemes:** India’s government has made substantial

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strides by implementing policies like **Startup India**, **Make in India**, and **PLI Schemes**, which actively support innovation.

- ✎ **Startup India Hub** serves as a one-stop platform connecting over 1,140 incubators and accelerators.

- ✎ In 2023, the **Startup India Seed Fund Scheme** allocated ₹945 crore to seed funding, emphasizing the government's commitment to fostering innovation and entrepreneurship across sectors.

#### ✦ **Active Push to Research and Development:**

The government has heavily invested in creating strong academia-industry linkages to propel R&D in India.

- ✎ Programs like the **Atal Innovation Mission (AIM)** are driving collaboration between universities and industries to create cutting-edge products.

- ✎ The **Fund of Funds for Startups (FFS)**, with **₹10,000 crore backing**, channels funds through venture capital firms to support early-stage startups.

- 💡 Additionally, the **Union Cabinet recently approved a ₹1-lakh crore **Research Development and Innovation (RDI) scheme**** that aims to incentivise the private sector to invest in basic research.

#### ✦ **Incentivizing DeepTech Development:** In an effort to position India as a global leader in emerging technologies, the government has introduced initiatives focusing on **DeepTech** innovation.

- ✎ The **PLI scheme for semiconductor manufacturing and Quantum Technologies** aim to build self-reliance in advanced technologies.

- ✎ The recent announcement of **₹76,000 crore for the **National Semiconductor Mission**** is a case in point.

- 💡 India's government also introduced the **IndiaAI Mission**, which focuses on building AI capabilities and expanding the country's leadership in data science and machine learning.

#### ✦ **Support for Innovation in Tier-2 and Tier-3 Cities:**

The Indian government has significantly expanded the reach of its innovation ecosystem to include Tier-2 and Tier-3 cities, reducing the concentration of innovation in metropolitan hubs.

- ✎ Through initiatives like the **Atal Tinkering Labs (ATLs)** and **Pradhan Mantri Mudra Yojana (PMMY)**, smaller cities are being included in the innovation framework.

- ✎ According to **Economic Survey 2023-24**, more than **45%** of Department for Promotion of Industry and Internal Trade (DPIIT)-recognized startups are **emerging out of tier-2 and tier-3 cities**.

#### 💡 **Private Sector Led:**

#### ✦ **Venture Capital and Angel Investments**

**Fueling Growth:** Private sector investments, particularly from venture capital and angel networks, are driving India's startup ecosystem.

- ✎ India saw a significant surge in deep tech startups in 2023 with 480 new ventures emerging, making it the third largest pool globally.

- ✎ Platforms like **LetsVenture** and **Indian Angel Network** continue to provide critical early-stage funding to emerging companies.

#### ✦ **Private Sector in CleanTech:** The private sector is actively driving the development of **CleanTech** innovations.

- ✎ Startups like **Ather Energy**, **ReNew Power**, and **Ola Electric** are leading the charge in **electric vehicles** and **renewable energy** solutions.

- ✎ The growing demand for sustainable tech solutions has prompted significant private sector investments in these areas.

- ✎ More than **63 cleantech startups** have come up with unique solutions to contribute to **India's SDG goals**.

#### ✦ **Growth of India's Unicorns and Emerging Sectors:**

The rise of unicorns and tech-driven startups is perhaps the most visible sign of private sector innovation in India.

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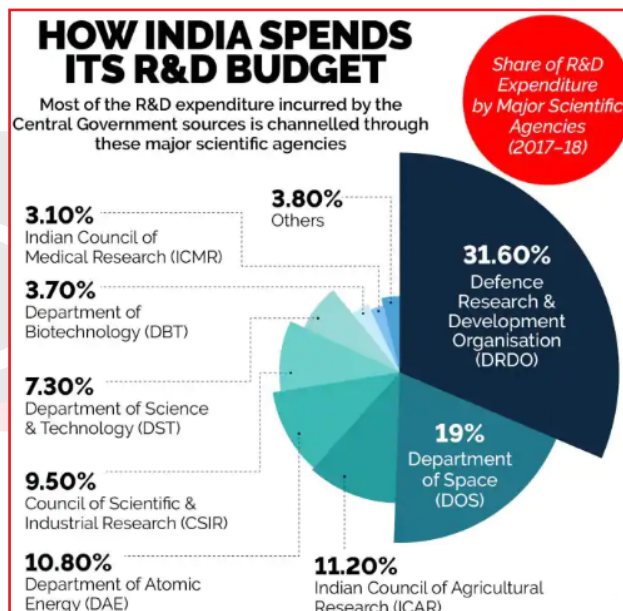
- ✎ In 2022, India hit the milestone of **100 unicorns**, making it the third-largest startup ecosystem globally.
- ✎ Companies like **Swiggy and Zomato** in **foodtech**, and **Razorpay** in **fintech** are driving India's innovation narrative.
- 💡 These firms have **not only raised billions in funding but also expanded globally**, highlighting India's growing reputation as a hub for technological entrepreneurship.
- ✦ **Tech-Enabled Solutions in Healthcare and Education:** Private players are playing a crucial role in transforming India's **healthcare** and **education** sectors through technology.
- ✎ **Practo, 1mg, and Dozee** are revolutionizing healthcare with AI-based diagnostics and telemedicine, addressing the accessibility challenges faced by millions.
- ✎ On the education front, **India's EdTech market** is expected to reach **USD 10.4 billion by 2025**.

### What are the Key Issues Associated with India's Innovation Ecosystem?

- 💡 **Regulatory Bottlenecks and Complex Compliance Frameworks:** India's innovation ecosystem is stifled by a complex regulatory environment, often hindering the speed and scalability of startups.
- ✦ Despite government initiatives, navigating through layers of compliance remains a challenge, particularly for new ventures in emerging technologies.
- ✦ In 2020, India ranked **63rd** in the **Ease of Doing Business Index** due to stringent licensing requirements and approval delays.
  - ✎ These delays discourage innovation, especially in fast-evolving sectors like **AI** and **blockchain**, where agility is critical.
  - ✎ The **Startup India** initiative aims to streamline this, but the pace of regulatory reforms remains slow.
- 💡 **Low R&D Investment and Lack of Deep-Tech Focus:** India's R&D expenditure, at **0.7% of GDP**, lags far behind global leaders such as the **USA**

(**3.5%**) and **China (2.4%)**, limiting its capacity for technological breakthroughs.

- ✦ While the government has set ambitious goals in **Union Budget 2025** with initiatives like the **Fund of Funds for DeepTech**, private sector involvement remains insufficient.
- ✦ In 2023, India allocated **₹1 lakh crore** towards R&D, but the bulk of the spending is directed at infrastructure.
- ✎ The **private sector accounts for only 35% of the R&D investment** in India while the sector contributes 75% of R&D in the US and China



- 💡 **Talent Drain and Skill Mismatch:** India faces a **significant brain drain**, with many of its brightest minds seeking opportunities abroad due to better funding and infrastructure for research.
- ✦ Only **8.25%** of Indian graduates work in jobs matching their education.
- ✦ Estimates show that **only about 51.25% of the youth is deemed employable**.
- 💡 **Inadequate Intellectual Property (IP) Protection and Commercialization:** India faces challenges in the commercialization of intellectual property, with **over 100,000 patents granted in FY24**, yet a large portion remains unutilized.

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✦ This gap between **IP generation and commercialization** is linked to insufficient awareness and weak enforcement mechanisms.

✦ While the **National Intellectual Property Rights Policy** aims to boost IP commercialization, the patent filing process remains time-consuming, with some waiting times extending to **5 years**.

💡 **Funding Gaps in Early-Stage Innovation:** While the venture capital scene in India has grown, there remains a **funding gap** for startups at the seed and early growth stages.

✦ In 2023, **VC funding in India** declined by **67% YoY**, highlighting investors' cautious approach amid global uncertainties.

📌 Early-stage startups in **DeepTech, AI, and quantum computing** particularly struggle to secure funding due to perceived risks.

✦ While schemes like the **Startup India Seed Fund Scheme (SISFS)** offer seed capital, the funding remains insufficient to cater to India's diverse and expanding startup ecosystem.

💡 **Infrastructure Gaps for Prototyping and Testing:** India's innovation infrastructure is still underdeveloped, particularly in the areas of **prototyping and testing**.

✦ While the government is investing in initiatives like **Digital Public Infrastructure (DPI)** and **IndiaAI Mission**, physical testing and prototyping facilities remain scarce, especially in **Tier-2 and Tier-3 cities**.

📌 The **lack of this critical infrastructure hampers product development**, slowing the commercialisation of high-tech innovations and reducing the competitiveness of Indian firms on the global stage.

💡 **Lack of Commercialization of Grassroots Innovations:** While India excels in **grassroots innovations**, there is a significant gap in **commercializing** these solutions at scale.

✦ Innovations in **agritech, clean energy, and healthcare** often remain local due to a lack of visibility and market access.

📌 The collaboration between organizations like the **National Innovation Foundation (NIF)** and **Amazon India** is a step forward, but commercialization remains a bottleneck.

✦ Public-private collaborations and improved IP frameworks are essential to leverage these innovations for broader societal impact.

💡 **Unbalanced Growth Across Sectors:** India's innovation ecosystem has seen significant growth in sectors like **foodtech, fintech and edtech**, but other sectors such as **manufacturing and semiconductors** have lagged behind.

✦ India's challenge lies in creating balanced innovation across all sectors, ensuring that both digital and traditional industries receive equal attention and funding.

📌 India's Commerce Minister has urged **Indian startups to shift their focus from food delivery apps to high-tech sectors like semiconductors and AI**.

### What Measures can India Adopt to Enhance Public-Private Synergy in India's Innovation Ecosystem?

💡 **Establish Public-Private Innovation Hubs:** India can create dedicated **Public-Private Innovation Hubs** in key technology sectors such as **AI, semiconductors, and clean energy**, where the government, academia, and industry come together to co-develop solutions.

✦ These hubs should offer shared resources like **testing facilities, prototype labs, and venture funds** to foster collaboration at every stage of innovation.

✦ Such hubs would accelerate the commercialization of ideas, reduce R&D costs, and build cross-sector partnerships, creating a smoother pathway from **concept to market**.

💡 **Incentivize Corporate Participation in R&D:** To drive deeper engagement, the government can offer targeted tax incentives for private companies investing in **cutting-edge R&D and deep-tech** projects.

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- ✦ These incentives should be tied to measurable outcomes such as **patents, prototypes, and industry applications**.

- ✦ This would ensure that companies view R&D not only as a business expense but as a strategic long-term investment, which aligns private interests with national goals in sectors like **healthcare, green energy, and digital technologies**.

💡 **Strengthen Industry-Academia Partnerships:** A concerted effort must be made to bridge the gap between **academic research** and **industry needs**.

- ✦ Public research institutions should partner with private companies to co-design **curriculums**, develop industry-specific **research agendas**, and create **internship and mentorship programs** for students.

- ✦ By aligning academic research with real-world industry requirements, these partnerships can ensure that the next generation of innovators is prepared to solve critical challenges in areas like **AI, agritech, and cybersecurity**.

💡 **Foster Open Innovation Models:** India should promote **open innovation** models, where public and private stakeholders share resources and intellectual property to accelerate the pace of technological development.

- ✦ The government can act as a facilitator by creating **open-access platforms** where innovators, startups, and established companies can share technologies, data, and findings.

- ✦ This collaborative approach can unlock synergies in **clean tech, renewable energy, and data science**, making innovation more inclusive and efficient.

💡 **Create Flexible Public Procurement Mechanisms:** To further integrate public and private efforts, India can revamp its **public procurement policies** to prioritize the purchase of **innovative technologies** from startups and small enterprises.

- ✦ By implementing **outcome-based tenders** and **phased payment structures**, the government can lower the entry barriers for startups while

encouraging them to align their products with public needs.

- ✦ This would provide a market for emerging technologies, especially in sectors like **smart cities, healthcare innovations, and sustainable infrastructure**.

💡 **Facilitate Cross-Sector Collaborations through Industry Councils:** Establishing **sector-specific industry councils** that bring together government bodies, private enterprises, and academia could ensure consistent dialogue and collaboration in emerging fields.

- ✦ These councils can act as advisory bodies to shape public policy, identify funding gaps, and direct resources to the most critical innovation areas.

- ✦ For instance, a **CleanTech Council** could drive innovations in **solar power, electric vehicles, and energy efficiency**, with active participation from private sector leaders and public regulators.

💡 **Encourage Government-Backed Private Angel Funds:** The government can partner with **private investors** to create **angel funds** that focus on early-stage innovation.

- ✦ These funds can support startups working on high-risk, high-reward technologies, especially in deep-tech and **frontier technologies**.

- ✦ Government-backed funds would bring more credibility to early-stage investments, thereby reducing the risk for private investors.

💡 **Collaborative Talent Development Programs:** A strong workforce is crucial for innovation, and public-private partnerships can play a key role in **skill development** and **talent cultivation**.

- ✦ Governments can partner with **corporations** to launch **upskilling programs** that focus on the latest technologies such as **blockchain, data science, and machine learning**.

- ✦ This could include **jointly-funded fellowships, internships and certificate programs**, ensuring that the talent pool is aligned with industry needs while also fostering a culture of lifelong learning.

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- 💡 **Create Regional Innovation Clusters:** India can further enhance public-private synergy by developing **regional innovation clusters** in non-metro areas.
  - ✦ These clusters can integrate local government support with private sector resources to foster regional entrepreneurship and innovation, particularly in underserved sectors like **rural agri-tech** and **social enterprises**.
  - ✦ By decentralizing innovation and providing resources such as funding, mentorship, and infrastructure, these clusters can boost localized solutions that can scale nationally and globally.

### Conclusion:

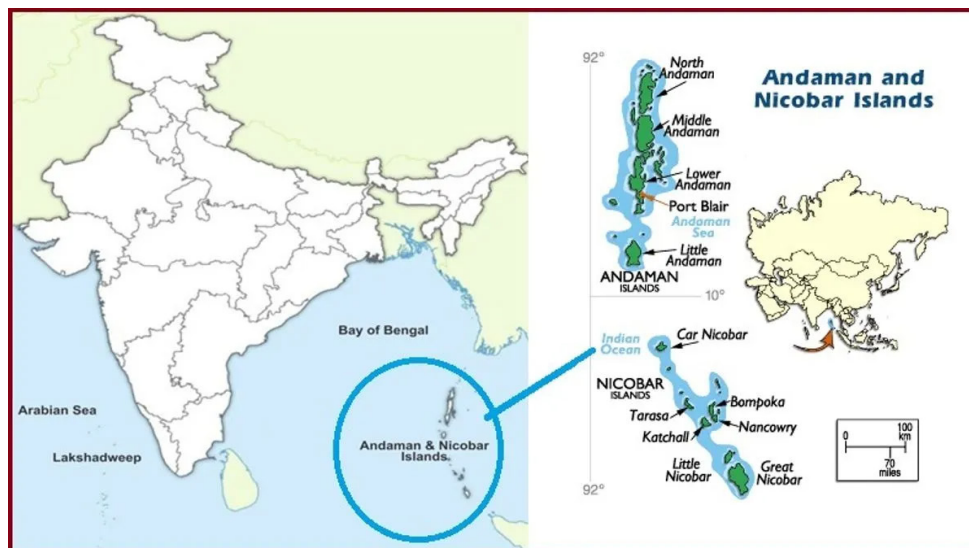
India must foster stronger **public-private synergies** to realize the full potential of its innovation ecosystem, as envisioned in the **Science, Technology, and Innovation Policy (STIP) 2020**. By aligning these efforts with **SDG 9 (Industry, Innovation, and Infrastructure)**, India can drive inclusive and sustainable growth. Enhanced collaboration will accelerate breakthroughs in critical sectors like clean energy, healthcare, and technology, ensuring that **India not only becomes a global innovation leader but also achieves long-term, equitable development**.

## Sustaining Development in Andaman and Nicobar Islands

*This editorial is based on “**Projects in Great Nicobar Island have strategic importance. Government must address transparency concerns**” which was published in The Indian Express on 09/07/2025. The article brings into picture the rapid infrastructure push in the Andaman and Nicobar Islands to counter China’s presence in the Indo-Pacific, while highlighting concerns over the Great Nicobar project’s impact on the environment and tribal communities, calling for a balanced and sustainable approach.*

**Tag:** GS Paper - 3, Growth & Development, Environmental Pollution & Degradation, GS Paper - 2, Government Policies & Interventions, Issues Related to SCs & STs.

India has accelerated infrastructure development in the **Andaman and Nicobar Islands** over the past five years, recognizing their strategic importance as a **security bulwark in the Indo-Pacific amid China’s growing naval presence in the Bay of Bengal**. However, the **Great Nicobar project** faces significant opposition from environmental activists and tribal rights advocates concerned about its impact on indigenous communities like the **Shompen people** and threatened species including leatherback turtles. India needs to promote sustainable development in the region that balances strategic imperatives with environmental protection and tribal rights.



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## What is the Significance of Andaman and Nicobar Islands for India?

- 💡 **Military Significance:** The Andaman and Nicobar Islands (ANI) are critical for India's military strategy, offering a strategic vantage point in the Indo-Pacific.
  - ✦ The **Andaman and Nicobar Command (ANC)** is India's only Tri-Service Command, ensuring rapid deployment of military assets.
    - 📌 India's growing military presence, including airbases like **INS Baaz**, **INS Utkrosh (Port Blair)** and **INS Kohassa (Shibpur)** highlights the region's increasing security role.
  - ✦ The islands' proximity to the **Malacca Strait (less than 350 km)** gives India a critical role in monitoring over 90,000 merchant ships annually.



- 💡 **Economic and Trade Connectivity:** Economically, the Andaman and Nicobar Islands play a vital role in India's maritime trade and logistics, acting as a hub for transshipment in the region.
  - ✦ The proposed **Mega Transshipment Port at Great Nicobar**, which is expected to handle **over 14 million TEUs annually**, positions India as a maritime trade leader.
  - ✦ About **75% of our transshipment cargo is handled at foreign ports**. This project aims to **reduce India's reliance on foreign ports like Singapore and Colombo**, where India loses millions annually in port handling fees.
- 💡 **Environmental and Ecological Significance:** The Andaman and Nicobar Islands are ecologically significant due to their rich biodiversity, including **numerous endemic species and diverse ecosystems like coral reefs and rainforests**.
  - ✦ The **Andaman wood pigeon**, **Nicobar pigeon**, and **Andaman serpent eagle** are examples of endemic bird species.
  - ✦ These islands act as a natural laboratory for studying the impacts of climate change and hold global importance for conservation.
  - ✦ Also, extensive **seagrass beds** are found in the region, providing habitat for species like the **dugong**, the state animal.
- 💡 **Geopolitical Importance in Indo-Pacific:** Geopolitically, the ANI serves as a gateway for India's engagement in the Indo-Pacific region, especially amidst China's expanding presence.
  - ✦ The islands are pivotal for **India's Act East policy**, countering China's influence in the Bay of Bengal and Southeast Asia.

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✦ India's focus on expanding civilian infrastructure on the islands, such as the **INR 80,000 crore project for Great Nicobar**, reflects this geopolitical significance.

✦ In recent years, **China's growing presence at Sri Lanka's Hambantota port and Pakistan's Gwadar port** has escalated India's strategic calculus, pushing for stronger ties with countries like Indonesia and Australia.

💡 **Indigenous Communities and Tribals:** The Andaman and Nicobar Islands are home to several indigenous communities, including the **Great Andamanese, Onges, Jarawa, and Sentinelese in the Andaman Islands, and the Nicobarese and Shompen in the Nicobar Islands.**

✦ These tribes have unique cultures, languages, and ways of life, with some, like the Sentinelese, remaining largely isolated.

✦ However, the indigenous tribes have faced challenges such as disease, encroachment on their land, and loss of traditional ways of life.

💡 **Energy Security and Resource Potential:** The strategic location of the Andaman and Nicobar Islands also offers immense potential for **India in energy security, particularly through offshore resources.**

✦ The islands lie close to **unexplored subsea mineral deposits, including polymetallic nodules** rich in cobalt, nickel, copper, and manganese—critical for India's growing demand for rare earth metals.

✦ These resources have become even more crucial as global demand for renewable energy technologies, such as **solar panels and electric vehicle batteries**, increases.

💡 **Tourism and Sustainable Development:** The archipelago's pristine beaches, coral reefs, and rich biodiversity make it an **attractive destination for eco-tourism.**

✦ In **2024**, the Islands' tourism sector achieved a significant milestone, recording a **120% increase in domestic arrivals.**

✦ Sustainable tourism initiatives, such as **promoting river cruises and wildlife watching**,

can provide economic benefits without compromising the island's ecological balance.

### What are the Key Issues Associated with Fan and Nicobar Islands?

💡 **Environmental Degradation and Biodiversity Loss:** The ongoing infrastructure projects, such as the **proposed transshipment port at Great Nicobar**, threaten to disrupt the delicate ecosystems that support rare species.

✦ Despite mitigation measures, large-scale deforestation is inevitable, releasing millions of tonnes of CO<sub>2</sub> and disrupting local wildlife habitats.

✦ Environmentalists estimate that the **project could release approximately 4.3 million tonnes of CO<sub>2</sub>**, aggravating the global climate crisis.

✦ Official estimates put the number of trees to be felled for the megaproject at **8–10 lakh**, but ecologists warn that the true toll could be as high as 10 million.

💡 **Threat to Tribal Rights and Indigenous Communities:** The expansion of infrastructure in the Andaman and Nicobar Islands raises significant concerns over the rights of indigenous tribes, particularly the **Shompen and Nicobarese.**

✦ The proposed development projects, especially those in the **Great Nicobar area**, risk disturbing tribal habitats and cultures, which are deeply tied to the land.

✦ The **Shompen, an isolated and vulnerable tribe**, could face dire consequences from increased interaction with the outside world.

✦ Activists warn that such developments could lead to **psychological trauma and even population decline for the Shompen tribe**, who have little immunity to diseases from outsiders.

💡 **Strategic Militarization and Regional Tensions:** The militarization of the Andaman and Nicobar Islands is a contentious issue, especially as India enhances its defense infrastructure to counter China's growing presence in the Indo-Pacific.

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- ✦ While the strategic importance of the islands is there, **there is concern that turning them into a militarized zone could heighten regional tensions**, particularly with neighbors like **Indonesia and Malaysia**.

✎ These countries have historically been apprehensive about India's military presence in the region.

- ✦ Such actions could exacerbate tensions in the region, complicating India's diplomatic relations.

💡 **Economic Disparity and Local Development:** The economic benefits of infrastructure development in the Andaman and Nicobar Islands, such as tourism and trade, **have not equally translated into local benefits for indigenous and marginalized communities**.

- ✦ While projects like the **Mega Transshipment Port** promise to boost regional trade, the local population, including tribal groups, risks being left out of the economic growth.
- ✦ The development plans propose the relocation of communities and the construction of new townships, but these initiatives have raised questions about their inclusiveness.
- ✦ For instance, **the relocation of Nicobarese after the 2004 tsunami to Afra Bay has been criticized for not integrating them fully into mainstream development**, leading to continued socio-economic challenges for these communities.

💡 **Rising Threat of Climate Change and Rising Sea Levels:** The islands, being low-lying, are especially vulnerable to the effects of global warming.

- ✦ The **Bay of Bengal** is experiencing a sea level rise of about 4.44 mm per year, which is **30% higher than the global average**.
- ✦ This rise could lead to submergence of coastal areas and disrupt local communities, particularly those in vulnerable zones like Nicobar.
- ✎ Such projections pose a serious challenge to long-term planning, and increased infrastructure development could exacerbate this vulnerability.

💡 **Poor Connectivity and Infrastructure Issues:** Despite the focus on infrastructure development, the islands continue to suffer from poor connectivity and infrastructure deficits, especially in remote areas.

- ✦ This **limits access to basic services like healthcare, education, and markets** for island residents, especially indigenous communities.
- ✦ The **lack of reliable transportation (both air and sea)** can delay emergency responses, affect tourism, and hinder economic growth.

💡 **Coral Reef Degradation in Andaman and Nicobar Islands:** The Andaman and Nicobar Islands are home to some of the country's most beautiful coral reefs.

- ✦ However, they face severe threats due to climate change and rising sea temperatures, which cause **coral bleaching by expelling the symbiotic algae essential for coral health**.
- ✦ **Overfishing, destructive fishing, and coastal development** lead to physical damage and sedimentation, while invasive species like the **crown-of-thorns starfish harm coral health**.
- ✎ Unregulated tourism and natural disasters such as cyclones also contribute to reef degradation.

### What Measures can India Adopt to Promote Sustainable Development in Andaman and Nicobar Islands?

💡 **Strengthening Environmental Regulations and Impact Assessments:** India must enforce **rigorous environmental regulations** and comprehensive **Environmental Impact Assessments (EIAs)** for all major infrastructure projects in the Andaman and Nicobar Islands.

- ✦ Projects like the **Great Nicobar development** risk destroying delicate ecosystems, impacting species such as the **Nicobar megapode**.
- ✦ More stringent assessments and **mitigation protocols** can prevent irreversible damage.

💡 **Fostering Sustainable Tourism Practices:** **Eco-tourism** should be prioritized in the Andaman and Nicobar Islands to preserve natural landscapes and promote **responsible tourism**.

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✦ By limiting tourist numbers and promoting **low-impact activities** like **river cruises** and **kayaking**, India can prevent overexploitation of the islands' natural resources.

✦ For instance, **Radhanagar Beach**, a popular tourist destination, faces immense pressure from high visitor volumes.

✎ **Tourist caps** and sustainable infrastructure can reduce environmental strain, with the Ministry of Tourism's **eco-certification program** as a guiding model for future development.

💡 **Integrated Coastal and Marine Resource Management:** An **Integrated Coastal and Marine Resource Management (ICMR)** approach must be adopted to protect marine ecosystems and promote **sustainable fishing**.

✦ The islands are home to highly biodiverse **coral reefs**, which are threatened by both climate change and human activity.

✦ By creating **Marine Protected Areas (MPAs)** and regulating **sustainable fishing methods**, India can preserve marine biodiversity.

✦ Similar initiatives like the **Coral Triangle Initiative** have improved marine biodiversity, showing the potential for **long-term ecological stability**.

💡 **Promoting Indigenous Rights and Inclusion in Development:** **Inclusive governance** is critical to ensure that indigenous tribes such as the **Shompen** and **Nicobarese** are meaningfully involved in development decisions.

✦ The **Forest Rights Act (FRA)** must be strictly adhered to, and the **free, prior, and informed consent (FPIC)** of indigenous communities should be sought.

✦ **Community participation** is essential for meaningful development, and local communities must be actively involved in the process.

✎ **Jairam Ramesh, Former Environment Minister**, had once pointed out that the Ministry of Environment neglected to document the concerns of the Shoempen tribe.

✎ It's important to ensure that all voices, especially from marginalized groups, are heard and considered in any developmental decision-making.

💡 **Enhancing Disaster Resilience and Climate Adaptation:** The Andaman and Nicobar Islands are vulnerable to **climate change impacts**, including rising sea levels and increased frequency of **extreme weather events**.

✦ India must prioritize **climate-resilient infrastructure**, ensuring that projects like the **transshipment port** are built to withstand **cyclones** and **tsunamis**.

✦ Post-2004 tsunami recovery showed the importance of **disaster-proofing** infrastructure.

💡 **Leveraging Renewable Energy for Self-Sufficiency:** The Andaman and Nicobar Islands should prioritize **renewable energy sources** like **solar**, **wind**, and **tidal energy** to reduce dependence on fossil fuels.

✦ These islands are ideally suited for **solar power projects** due to their abundant sunlight.

✎ The use of **solar microgrids** and **off-grid solutions** can promote energy self-sufficiency and lower **carbon footprints**.

💡 **Ecological Restoration and Reforestation Programs:** Restoring ecosystems affected by infrastructure development requires extensive **reforestation** and **ecological restoration** programs, particularly in **Great Nicobar Island**.

✦ These efforts should focus on restoring **rainforests**, coral reefs, and mangroves, which are vital to maintaining ecological balance.

✦ For example, **coral restoration** projects, although challenging, have successfully rejuvenated ecosystems in similar tropical regions.

✦ The **UN Convention on Biological Diversity (CBD)** reports that such programs can increase biodiversity, fostering a resilient, **sustainable environment**.

💡 **Developing Green Infrastructure and Low-Impact Construction:** India should adopt **green building practices** and **low-impact construction techniques** to minimize environmental damage.

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- ✦ This includes using **sustainable materials** for infrastructure, reducing construction waste, and promoting energy-efficient designs.
- ✦ **Great Nicobar's airport** and port construction can adopt **green infrastructure** standards, such as **solar-powered facilities** and **eco-friendly construction methods**.
- 💡 **Strengthening Local Capacity for Sustainable Livelihoods:** India must invest in **capacity-building programs** that teach local communities sustainable practices in sectors like **agriculture**, **eco-friendly fishing**, and **community-based tourism**.
- ✦ initiatives can help reduce economic dependency on harmful practices, promoting **sustainable livelihoods**.
- ✦ For instance, **organic farming** and **sustainable fishing** can provide long-term benefits without depleting natural resources.

### Conclusion:

The Andaman and Nicobar Islands' strategic, economic, and ecological significance demands a balance between development and conservation. As India advances infrastructure, sustainable practices must protect indigenous rights, biodiversity, and the environment. **"Sustainable development is not a choice, but a necessity for future generations."** By prioritizing renewable energy, eco-tourism, and climate resilience, India can align its growth with the UN **SDGs**, especially **Goal 13 (Climate Action)** and **Goal 15 (Life on Land)**.

## India's Shift to Electric Vehicles

*This editorial is based on "Why India must drive the future with EVs" which was published in Hindustan Times on 08/07/2025. The article highlights that India is swiftly shifting to electric vehicles (EVs) fueled by technological advancements and the potential for cost-effective EVs with renewable energy and local battery production..*

**Tag:** GS Paper - 3, Achievements of Indians in Science & Technology, Mobilization of Resources, GS Paper - 2, Government Policies & Interventions

India, the world's **third-largest automobile market**, plays a pivotal role in the global automotive sector, contributing nearly **7%** to its GDP. The transition to **electric vehicles (EVs)** is rapidly reshaping this landscape, as global trends push towards cleaner, greener transportation. In 2024, EVs accounted for **7.5%** of India's total vehicle sales, with electric two-wheelers leading the charge, comprising **60%** of total EV sales. With government initiatives like **FAME** and the **Production Linked Incentive (PLI) scheme**, coupled with technological breakthroughs in battery manufacturing, India aims to achieve ambitious EV adoption targets, transforming its mobility future.

### What is The Current Status of EV Adoption In India?

- 💡 **India's Growing EV Market:** India's EV market reached a 7.5% penetration in 2024–25, driven by increased consumer awareness and government incentives.
- ✦ The EV market's growth is still lagging behind global leaders like China, which saw over 50% of new cars sold as electric in 2024.
- 💡 **Electric Two-Wheelers Lead the Charge:** Electric two-wheelers make up 60% of the EV market, reflecting their affordability and **urban mobility** appeal.
- ✦ This segment has shown significant growth, especially as consumer preferences shift towards **cost-effective** and **eco-friendly** transportation.
- 💡 **EV Growth in Public Transport:** Public transport electrification is a key focus, with the government planning 14,000 e-buses by 2026.
- ✦ Several states, including **Telangana** and **Karnataka**, are scaling up e-bus fleets, enhancing urban sustainability and reducing pollution.
- 💡 **Policy Support Driving EV Adoption:** The government's FAME II scheme with a **₹10,000 crore budget** has accelerated EV adoption across segments.
- ✦ By incentivizing manufacturers and consumers, the policy has successfully boosted electric two- and three-wheeler sales.

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- 💡 **Technological Advancements in Battery Manufacturing:** India is investing in domestic battery manufacturing, particularly **Lithium Iron Phosphate (LFP) batteries**.

- ✦ This move is essential for reducing reliance on imports and promoting energy security while driving down the cost of EVs.

- 💡 **Targeting 2030 Milestones:** India aims for **80%** EV adoption in two- and three-wheelers, **40%** in buses, and **30%** in private cars by 2030.

- ✦ These ambitious targets are supported by initiatives like the PLI scheme, aiming to accelerate domestic manufacturing.

## What are The Challenges

### Hindering EV Adoption In India?

- 💡 **High Initial Cost of EVs:** The **high upfront cost** of EVs, typically 20-30% more than **Internal Combustion Engine (ICE) vehicles**, remains a significant barrier.

- ✦ Government subsidies and **GST** reductions have not been sufficient to make EVs affordable for lower-income groups.

- ✦ Also, the variety of EV models in the **affordable segment** is limited compared to ICE vehicles

- 💡 **Insufficient Charging Stations:** India has only **one public charging station per 135 EVs**, significantly lower than the global average of one station for every 6-20 EVs.

- ✦ To meet the target of 3.9 million charging stations by 2030, urgent expansion of infrastructure is required.

- ✦ Also, building EV charging stations is **capital-intensive**, posing a challenge for rapid infrastructure expansion.

- ✦ The **reliability of the electrical grid** in some regions remains a challenge for efficient charging station operation.

- ✦ Additionally, there is a lack of standardization, with fragmented charging standards and connectors across different manufacturers, further complicating the seamless adoption of EV infrastructure.

- 💡 **Dependence on Imported Batteries:** India imports **over 90%** of its lithium-ion batteries, making the EV sector vulnerable to global supply chain disruptions.

- ✦ Efforts to establish local battery manufacturing are ongoing but have not yet significantly reduced this dependency.

- 💡 **Regulatory and Policy Uncertainty:** Shifting policies, such as import **duty exemptions** and changes in tax regimes, create uncertainty for both manufacturers and consumers.

- ✦ A stable, long-term policy framework is crucial for fostering confidence in the EV market.

- ✎ Shifting policies, like the recent shift from FAME II to PM eDrive, create uncertainty for manufacturers and consumers, highlighting the need for a stable, long-term EV policy framework.

- 💡 **Range Anxiety and Battery Life:** Consumers are concerned about the limited range of EVs, which leads to '**range anxiety**'.

- ✦ While battery technologies have improved, fast-charging solutions remain scarce, further deterring potential buyers.

- 💡 **Low Consumer Awareness and Financial Barriers:** Low consumer awareness about EV benefits and technology hampers widespread adoption.

- ✦ Additionally, limited financing options and poor resale value deter potential buyers.

## What Steps Have Been Taken

### to Promote EV Adoption in India?

- 💡 **PM E-Drive Scheme:** The **PM Electric Drive Revolution in Innovative Vehicle Enhancement (PM E-DRIVE) Scheme**, aims to provide impetus to green mobility and the development of the EV ecosystem in India, with an outlay of **₹10,900 crore** over two years(2024-2026).

- 💡 **Investment in Charging Infrastructure:** India is accelerating the development of its EV charging infrastructure under the **PM E-Drive Scheme**, with a **₹2,000 crore** allocation to establish **72,000** charging stations nationwide.

- ✦ These stations will be strategically placed along key cities, highways, airports, and

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industrial corridors to ensure widespread access.

- ✦ **Bharat Heavy Electricals Limited (BHEL)** will serve as the nodal agency for demand aggregation and the development of a unified EV super app to support this nationwide initiative.

- ✦ Also, the government has been addressing the gap in charging infrastructure by sanctioning over 7,000 public charging stations under **FAME II**.

- 💡 **E- Vehicle Policy:** The Union Government has approved a **new policy (2024)** to promote India as a manufacturing destination for **electric vehicles (EVs)**, with a minimum investment requirement of **₹4,150 crore** and no cap on maximum investment.

- ✦ The policy sets a **3-year timeline** for setting up manufacturing facilities and starting commercial production, with a goal of **achieving 50% domestic value addition within 5 years**, while also allowing limited imports of EVs at a lower customs duty for manufacturers meeting the investment criteria.

- 💡 **State-Level Initiatives:** States like **Telangana, Karnataka and UT Delhi (Switch Delhi campaign)** are expanding their electric bus fleets as part of the PM E-DRIVE scheme.

- ✦ These state-led initiatives contribute to the nationwide push towards sustainable public transport.

- ✦ The integration of various initiatives is expected to create a seamless EV mobility experience while generating green jobs and reducing carbon emissions.

- 💡 **Government Incentives:** The government had launched key initiatives like the **FAME II scheme** with a ₹10,000 crore budget to incentivize EV adoption.

- ✦ These schemes have played a crucial role in boosting the adoption of electric two-wheelers, three-wheelers, and buses.

- 💡 **Support for Domestic Battery Manufacturing:** Through the **PLI scheme**, the government is

promoting domestic battery manufacturing, with ₹18,100 crore allocated for **Advanced Chemistry Cells (ACC)**.

- ✦ This effort aims to reduce dependence on imported batteries and lower EV costs.

- 💡 **Policy Reforms for Local Manufacturing:** The **Scheme to Promote Manufacturing of Electric Passenger Cars (SPMEPCI)** offers reduced import duties and encourages global EV manufacturers to set up production in India.

- ✦ This scheme aims to strengthen India's domestic manufacturing capacity, create jobs, and build a sustainable EV ecosystem.

- 💡 **Other Initiatives:**

- ✦ **Electric Mobility Promotion Scheme:** The scheme aims to promote electric vehicles (EVs) by offering incentives for their adoption and manufacturing.

- ✍ It focuses on reducing carbon emissions, enhancing air quality, and supporting India's transition to sustainable mobility.

- ✦ **GST on EVs and Charging Equipment Reduced to 5%:** The reduction of Goods and Services Tax (GST) to 5% on EVs and charging equipment is designed to make EVs more affordable for consumers.

- ✍ This move incentivizes the adoption of cleaner, greener vehicles by lowering the overall cost.

- ✦ **PM e-Bus Sewa Scheme for Public Transport:** launched by the **Ministry of Housing and Urban Affairs**, seeks to deploy 10,000 e-buses on a PPP model, offering central assistance for infrastructure development at varying levels based on state and city types.

- ✦ **EV Mitra Scheme:** The EV Mitra Scheme simplifies the process for EV owners to claim subsidies and incentivizes awareness about the benefits of electric vehicles.

- ✍ It aims to create a more accessible, transparent platform for users to access government subsidies and incentives for EV adoption.

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## Incentives for Electric Vehicles Under PM E-DRIVE Scheme

|                             | <br><b>Demand Incentives</b> | <br><b>Charging Infrastructure</b> | <br><b>Capital Asset Grants</b> |
|-----------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b>              | Reduces upfront EV cost                                                                                       | Establishes public charging stations                                                                                | Supports e-bus deployment/upgrades                                                                                 |
| <b>Beneficiary</b>          | Consumers, OEMs                                                                                               | Public, EV users                                                                                                    | Public Transport, Testing agencies                                                                                 |
| <b>Financial Allocation</b> | Not specified                                                                                                 | ₹2,000 crore                                                                                                        | ₹4,391 crore (e-buses), ₹780 crore (upgrades)                                                                      |
| <b>Eligibility</b>          | CMVR registered, advanced batteries                                                                           | Not specified                                                                                                       | Not specified                                                                                                      |

### What is The Way Forward For India's EV Sector?

- 💡 **Accelerating Battery Production:** India must focus on scaling up **domestic battery production** to meet the growing demand for EVs.
  - ✦ Investment in research and development of new battery technologies, such as solid-state batteries, will be key to enhancing efficiency and reducing costs.
  - ✦ Leveraging India's **National Critical Mineral Mission** to enhance **domestic lithium exploration**.
- 💡 **Expanding Charging Infrastructure:** Expanding the charging infrastructure is critical for accelerating EV adoption.
  - ✦ The government should focus on building a **more extensive and accessible network** of charging stations, especially in rural and semi-urban areas.
  - ✦ Implement interoperable charging standards and promote **battery swapping and Battery-as-a-Service (BaaS) models**.
  - ✦ A successful EV transition requires collaboration between the **government, private investors, and technology innovators**.
  - ✦ A well-defined and scalable charging ecosystem is necessary to ensure **accessibility, affordability, and long-term sustainability**.
- 💡 **Learning from Global Best Practices:** India can learn from global EV leaders like **California, the UK, and Singapore**, who have successfully implemented incentive-driven models and **public-private partnerships (PPPs)**.

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✦ Adopting similar approaches, such as streamlining **permits, land acquisition, and interoperability standards**, could strengthen India's charging network.

✦ Learning from **Germany's ELISA (Electrified Innovative Heavy Traffic on the Autobahn)** project which has successfully demonstrated the viability of electrified highways, where hybrid trucks are powered via overhead catenary lines, reducing fuel costs and emissions.

💡 **Hybrid Financing Models:** To address the capital-intensive nature of building charging stations, India could explore **innovative financing models** such as **green bonds**, **loans with low-interest rates**, and international collaborations.

✦ Establish clear government-backed financial incentives, ensuring private investors are encouraged to contribute to the expansion of charging infrastructure.

💡 **Harmonize Center And State Level Policies:** A stable, **long-term policy** framework is needed to guide the growth of India's EV sector.

✦ Continued support for **local manufacturers**, along with measures to foster innovation, will be crucial to achieving India's EV goals.

✦ Also, the government should streamline the **land acquisition** process for charging stations by offering incentives for the use of government-owned land or simplifying the permissions process.

✦ Resolve GST disparities between finished EVs and raw materials to lower costs and improve sector competitiveness.

💡 **Focus on Research and Development:** India must invest in **R&D** to overcome the current limitations of EV technologies.

✦ By fostering innovation in **battery efficiency, vehicle range, and charging speed**, India can enhance the competitiveness of its EV sector.

✦ For example, investing in advanced battery chemistries (e.g., solid-state, sodium-ion) to improve range.

💡 **Collaboration with International Markets:** India should seek strategic collaborations with global EV manufacturers to gain access to cutting-edge technologies.

✦ This will not only boost domestic manufacturing but also help India establish itself as a key player in the global EV market.

✦ Also, India should seek strategic collaborations with **Argentina**, a major lithium producer, to secure access to its abundant lithium reserves.

💡 **Hydrogen Fuel Cell Electric Vehicles:** Integrating the **National Green Hydrogen Mission** can catalyze the creation of a sustainable hydrogen ecosystem in India, focusing on increasing green hydrogen production and expanding refueling infrastructure.

✦ Additionally, incentivizing fuel cell technology will facilitate the transition to zero-emission **hydrogen fuel cell electric vehicles**.

💡 **Focus on Market Segments and Use Cases:** Electrifying **public and commercial fleets** by prioritizing buses, taxis, and last-mile delivery vehicles is crucial, as they have high utilization rates and a significant impact on emissions.

✦ **Promoting two- and three-wheelers** by continuing incentives is essential, as these segments dominate India's vehicle market and are key to accelerating EV adoption.

## Conclusion

India's EV journey, driven by innovative policies, technological advancements, and growing consumer awareness, is set to reshape its automotive landscape. With continued focus on infrastructure development, domestic battery manufacturing, and strong policy support, India is poised to meet its ambitious EV adoption targets. This transition will **foster sustainable growth, enhance energy security**, and contribute significantly to global climate goals.

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## Revitalizing Forests for A Sustainable India

*This editorial is based on “[Inclusions and exclusions in India's forest governance](#)” which was published in The Hindustan Times on 14/07/2025. The article brings into picture the Supreme Court's expansive role in forest governance through the Godavarman case, which broadened the definition of 'forest' but also led to centralized control, often overlooking community-based conservation.*

**Tag:** GS Paper - 2, GS Paper - 3, Conservation, Issues Relating to Development, Management of Social Sector/ Services, Forest Resources

The [Supreme Court's](#) involvement in forest governance, initiated by [T.N. Godavarman Thirumulpad's 1995 petition](#), has significantly influenced India's environmental policies. Through the Godavarman case, the Court has expanded the **definition of 'forest'** to include areas recorded as forest in government records, irrespective of vegetation type. This broad interpretation has led to the **inclusion of diverse ecosystems, such as grasslands and scrublands, under forest protection laws.** While this approach aims to enhance conservation, it has also centralized forest governance, **often sidelining community-based conservation models.** As a result, India's forest governance must now consider broader, inclusive conservation models that account for ecological diversity and community rights.

### How are Forests a Cornerstone of India's Ecological and Developmental Vision?

- 💡 **Ecological Balance and Biodiversity:** Forests are crucial in maintaining India's **ecological balance by supporting diverse ecosystems.**
  - ✦ The protection of forests ensures the survival of a wide array of species and preserves critical habitats.
  - ✦ India's forests are home to **~80% of terrestrial biodiversity**, including endangered species like the [Bengal tiger](#) and the [Asiatic lion](#).

- ✦ As per the [India State of Forest Report 2023](#), India's forest and tree cover constitutes **25.17%** of the country's geographical area, showcasing their ecological importance. The loss of biodiversity, if not managed, **risks the collapse of ecosystem services vital for survival.**

💡 **Carbon Sequestration and Climate Change Mitigation:** Forests play a pivotal role in mitigating climate change by acting as carbon sinks. They absorb **large amounts of CO<sub>2</sub>**, thus slowing down global warming.

- ✦ India's forests and trees currently store **30.43 billion tonnes of CO<sub>2</sub> equivalent**, contributing significantly to carbon sequestration.

- ✦ The [National Forest Policy](#) aligns with global commitments, targeting forest cover expansion to reach **33% of the country's land area.**

📝 India's **NDC target for 2030** includes creating an additional carbon sink of **2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent** through increased forest and tree cover.

💡 **Livelihood Support for Rural and Tribal Communities:** Forests are the lifeblood of over **250 million people in India** who directly depend on forest resources for their livelihoods.

- ✦ Forests provide timber, fuelwood, medicinal plants, and **non-timber forest products (NTFPs)** that are crucial for rural economies.
- ✦ The [Forest Rights Act \(2006\)](#) seeks to recognize community rights, allowing greater autonomy for forest-dwelling populations.

💡 **Water Cycle Regulation and Soil Conservation:** Forests play a key role in regulating water cycles and conserving soil, preventing erosion and floods.

- ✦ The **depletion of forests directly impacts water availability**, especially in drought-prone regions.
- ✦ In areas like the [Western Ghats](#) and [Rajasthan's Aravallis](#), forests maintain **watershed integrity**, ensuring water for agriculture and domestic use.

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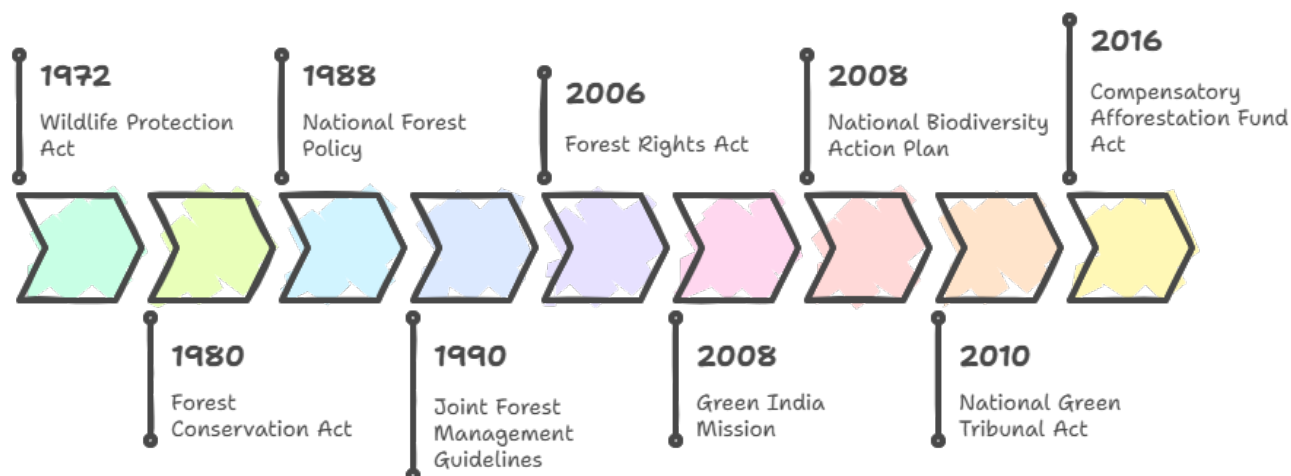


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- ✦ The **India State of Forest Report 2023** notes the critical role of forests in preventing desertification, **especially in regions like Rajasthan**, where forest cover helps reduce the effects of water scarcity.
- 💡 **Economic Development and Green Growth:** Forests are a vital source of raw materials for industries, contributing to the economy through **timber, paper, and pharmaceuticals**.
  - ✦ The growing trend of green businesses, including **eco-tourism** and **sustainable timber**, indicates the potential for forests to drive inclusive economic development.
  - ✦ In states like Telangana, where initiatives like the **Haritha Haram** program have led to significant increases in forest cover, green development models are creating new job opportunities.
- 💡 **Disaster Risk Reduction and Resilience:** Forests are natural buffers against disasters such as **floods, droughts, and landslides, particularly in vulnerable regions**.
  - ✦ They help in reducing the severity of natural disasters by stabilizing soil and absorbing excess rainfall.
  - ✦ In regions like **Uttarakhand**, where landslides are frequent, forests have been pivotal in maintaining hillside stability and preventing loss of life.
- 💡 **Tourism and Cultural Identity:** Forests are a significant source of eco-tourism, which drives both local economies and cultural preservation.
  - ✦ Forests in regions like the **Sundarbans** and **Kanha National Park** attract millions of visitors, generating income for local communities and promoting conservation awareness.
    - 📌 Tourism revenues from wildlife and forest reserves also help fund conservation activities, benefiting both the environment and local communities.
  - ✦ **Wildlife tourism** in India has seen a significant annual growth rate of approximately **15%**, contributing to the economy and job opportunities.

### Key Milestones in India's Forest Conservation Initiatives



### What are the Key Issues Associated with Forest Management in India?

- 💡 **Deforestation and Forest Land Diversion:** Forests are being cleared for infrastructure projects, mining, and agriculture, which severely impacts biodiversity and climate.

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✦ Despite the **Forest Conservation Act (FCA) of 1980** and Supreme Court rulings, forest land continues to be diverted, undermining conservation efforts.

✦ Also, The **2023 amendments to FCA 1980** exempt certain forest lands from its purview and exclude certain activities from the definition of non-forest purposes.

✍ The central government approved the diversion of **28,880 hectares of forest land in 2023-24**.

💡 **Implementation of Forest Rights Act (FRA):** The **Forest Rights Act (2006)** was a landmark move to recognize and secure the rights of tribal communities over forest resources.

✦ However, the implementation of the Act has faced significant hurdles, with **incomplete recognition of Community Forest Rights (CFR)** in many states.

✦ 16 years after the Forest Rights Act (FRA), over 250 million forest-dependent people still face denial of rights, with states like **Madhya Pradesh, Rajasthan, and West Bengal** showing zero CFR recognition.

💡 **Conflict Between Conservation and Development:** India's development agenda often clashes with forest conservation goals, creating tension between economic growth and ecological sustainability.

✦ While **forest reserves like national parks and tiger sanctuaries** are crucial for biodiversity, the demand for land for industrial development and urbanization is escalating.

✦ For example, the **Narmada Basin project**, aimed at increasing irrigation and energy supply, led to deforestation and diversion of significant forest areas.

✍ Similarly, the **Mumbai-Ahmedabad bullet train project** threatens forest areas, particularly in Maharashtra's dense forest patches.

### Balancing Conservation and Development



💡 **Monoculture Plantations and Loss of Biodiversity:** The push for afforestation programs has led to an **increase in monoculture plantations**, which fail to replicate the biodiversity found in natural forests.

✦ While tree planting is seen as a solution to mitigate deforestation, it often undermines ecosystem services such as wildlife habitats, soil fertility, and water retention.

✦ The **India State of Forest Report 2023** highlights that a significant portion of new forest cover in India is **made up of non-native species like eucalyptus and teak**, which provide limited ecological benefits compared to native **biodiversity-rich forests**. This raises concerns about the long-term ecological health of these areas.

💡 **Forest Governance and Bureaucratic Challenges:** The governance of forest resources in India is highly centralized, with the **Forest Department controlling most decisions related to forest management, often sidelining local communities**.

✦ The lack of decentralization and community involvement in decision-making has led to inefficiencies and conflicts between the state and forest-dependent communities.

✦ The **ongoing implementation of Joint Forest Management (JFM) schemes** remains largely ineffective, with communities often having limited control over forest resources.

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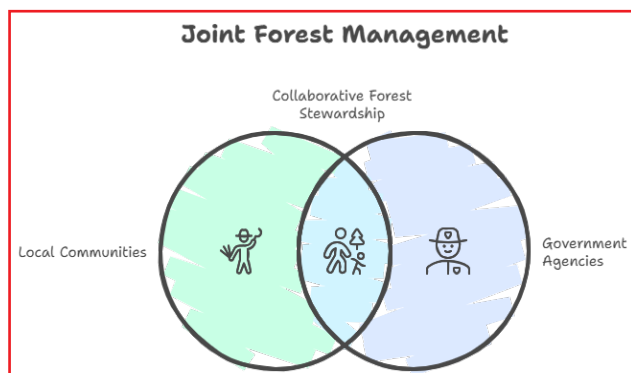
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- ✎ In places like **Chhattisgarh**, local communities are increasingly calling for more autonomy, but bureaucratic resistance continues to stifle these efforts.



- 💡 **Loss of Forest-Based Livelihoods:** With increasing commercialization of forests, local communities that have depended on forest resources for their livelihoods are being marginalized.

- ✦ Forests provide essential resources such as firewood, timber, medicinal plants, and non-timber forest products (NTFPs).
- ✦ However, **policies such as the privatization of forest resources and restrictions on NTFP collection** have threatened the livelihoods of over 250 million people in India.
  - ✎ For instance, due to unsustainable practices, **Lindur village in Himachal Pradesh's Lahaul and Spiti district is on the verge of collapse**, with large-scale land subsidence worsening since the 2023 monsoon **significantly impacting livelihood in the region**.

- 💡 **Impact of Climate Change on Forests:** Climate change is intensifying the challenges faced by forests in India, exacerbating the **risks of forest fires, pests, and diseases**.

- ✦ The **India State of Forest Report 2023** also notes that **over 92,000 sq km of forest was degraded between 2013 and 2023**, with climate change being a significant factor.
- ✦ Additionally, more frequent and intense wildfires, driven by global warming, pose a major threat to India's forest resilience.

- ✦ About **34,562 sq km of forests--that is, just over 1% of India's overall area--was burnt** in the last fire season from **November 2023 to June 2024**.

- 💡 **Encroachment and Illegal Logging:** **Illegal logging and encroachment on forest lands** continue to undermine forest conservation efforts.

- ✦ While the government has enacted laws and policies to curb illegal activities, enforcement remains weak, particularly in remote forest areas.
- ✦ The **rise in illegal timber extraction, especially in states like Madhya Pradesh and Chhattisgarh**, where forest areas are rich in valuable timber, poses a significant challenge to conservation.

- ✎ **Forest encroachments in India** are increasing at an alarming rate with government data indicating a **whopping 146% rise in a year**.

### What Measures can India Adopt to Ensure Sustainable Forest Management?

- 💡 **Integrated Forest Governance with Local Empowerment:** India must shift towards **decentralized forest governance**, where local communities, especially tribal and forest-dwelling populations, play a leading role in decision-making.

- ✦ Empowering **gram sabhas and local bodies under the Forest Rights Act** to manage forest resources with scientific inputs will ensure more sustainable and inclusive forest management.
- ✦ The involvement of local communities in forest conservation initiatives ensures **better compliance with regulations, reduces conflicts, and encourages traditional ecological knowledge**, which is often more suited to local conditions.

- 💡 **Ecological Restoration Over Monoculture Plantations:** Focus on **ecological restoration** rather than just large-scale monoculture plantations, which often undermine biodiversity.

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✦ **Restoration should prioritize native species**, ensure habitat connectivity, and address soil and water management.

✦ Collaborative efforts involving forest departments, research institutions, and local communities can help restore degraded landscapes and provide long-term ecological benefits.

✍ This approach is **more effective in maintaining ecosystem services such as water retention, soil fertility, and wildlife habitat**, compared to the generic and temporary gains from monoculture tree planting.

💡 **Strengthening Wildlife Corridors and Protected Area Networks:** India must expand and strengthen the network of wildlife corridors that connect isolated protected areas.

✦ These corridors facilitate the movement of species, preventing genetic isolation and promoting biodiversity. This can be achieved by **revisiting land-use policies, ensuring that infrastructure development projects consider wildlife corridors**, and investing in ecological restoration of fragmented habitats.

💡 **Promoting Agroforestry for Sustainable Livelihoods:** Incorporating agroforestry into farming systems can greatly reduce the pressure on natural forests while supporting local economies.

✦ **Agroforestry involves integrating trees into agricultural landscapes**, which can help restore soil fertility, prevent erosion, and enhance water retention.

✦ **Providing incentives, subsidies, and training for farmers** to adopt agroforestry practices will not only improve agricultural yields but also ensure that trees are maintained as a resource for both ecological and economic benefits.

💡 **Revamping Forest Management Education and Capacity Building:** Enhancing the capacity of forest management professionals and local forest officers through education and continuous training in modern ecological techniques is essential.

✦ **Developing specific programs focusing on climate change**, biodiversity conservation, and community engagement will improve the effectiveness of forest governance.

✦ Moreover, **empowering youth through environmental education and training programs** will create a generation of forest stewards dedicated to long-term conservation goals.

✦ **Maharashtra's Gadchiroli district stands out—where empowered local institutions have boosted incomes, created jobs, and conserved forests**, inspiring other states to demand similar roles in ecotourism and forest governance.

💡 **Forest Certification and Sustainable Timber Production:** To address the growing demand for timber and forest products without degrading forest ecosystems, India should promote **sustainable forest certification**.

✦ By developing a framework for forest certification that aligns with international standards (such as **scaling up FSC certification to enhance awareness**), India can ensure that timber and other forest resources are sourced sustainably.

✦ This measure would incentivize private landowners and corporations to manage forests responsibly, reduce illegal logging, and promote sustainable trade in forest products.

💡 **Adoption of Technology for Monitoring and Enforcement:** Leveraging **satellite technology**, drones, and AI-powered tools to monitor forest cover, track illegal logging, and assess ecosystem health can significantly enhance forest conservation.

✦ **Real-time data on forest conditions can help detect deforestation, encroachments, and forest fires early**, enabling quick intervention.

✍ The Forest Survey of India (FSI) utilizes data from the **MODIS (Moderate Resolution Imaging Spectroradiometer) sensor**, which is a significant step in the right direction.

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✦ Using these technologies alongside traditional ground-based monitoring will streamline enforcement and ensure better management practices across vast forested areas.

💡 **Increasing Public Awareness and Eco-Branding:** A national campaign to raise public awareness about the importance of forests for climate, biodiversity, and livelihoods is crucial.

✦ Additionally, creating **eco-brands** that **market products made from sustainably sourced forest products** can generate consumer demand for conservation.

✦ **Public-private partnerships** should be encouraged to support forest-friendly business models that help integrate forests into broader economic markets, thus **shifting consumer behavior towards more sustainable practices**.

💡 **Financial Mechanisms for Forest Conservation:** Establishing **forest conservation funds** sourced from **corporate social responsibility (CSR)**, environmental taxes, and international climate finance could provide a steady stream of funding for long-term conservation efforts.

✦ These funds can be used for **forest protection, restoration, and community development initiatives**.

✦ Furthermore, financial incentives for states that achieve conservation milestones could ensure sustained engagement with forest conservation on the ground.

💡 **Strengthening Legal and Policy Framework for Forest Protection:** India needs to strengthen the legal framework for forest protection by introducing **stricter penalties for illegal logging, land encroachment, and wildlife poaching**.

✦ Regular audits of forest conservation practices, along with **clearer land-use policies that prevent the encroachment of forest areas** for developmental projects, will reduce the pressure on forests.

✦ Ensuring that forest laws are not diluted for short-term development goals will maintain

the integrity of forest ecosystems and long-term sustainability.

### Conclusion:

Forests in India are crucial to achieving multiple **Sustainable Development Goals (SDGs)**, including **life on land (SDG 15)**, **climate action (SDG 13)**, and **decent work and economic growth (SDG 8)**. They maintain ecological balance, support biodiversity, and regulate water cycles, all while providing livelihoods to over 250 million people. To meet SDGs, India must adopt an inclusive approach that prioritizes both conservation and the rights of local communities. ***"Forests are the foundation of a sustainable future—protecting them is key to achieving the world we want."***

## Empowering India's Energy Transition With AI

*This editorial is based on **"AI's role in India's energy transition, a reality check needed"** which was published in The Hindu on 12/07/2025. The article brings into picture the role of AI in addressing India's doubling energy demand by 2030 through improved forecasting, grid efficiency, and reduced transmission losses, while highlighting the need for policy, investment, and inclusive engagement.*

**Tag:** GS Paper - 3, Environmental Pollution & Degradation, Renewable Energy, Achievements of India in Science and Technology

**India's energy demand** is set to double by 2030, pushing the nation toward ambitious targets of **500 GW non-fossil fuel capacity and net-zero by 2070**. Artificial Intelligence emerges as a transformative tool for this transition, offering solutions for **renewable energy forecasting, grid optimization, and reducing the sector's substantial 20-30% transmission losses**. Success in India's AI-driven energy transition requires collaborative efforts between government policy support, private investment, and community engagement to ensure benefits reach both urban and rural areas equitably.

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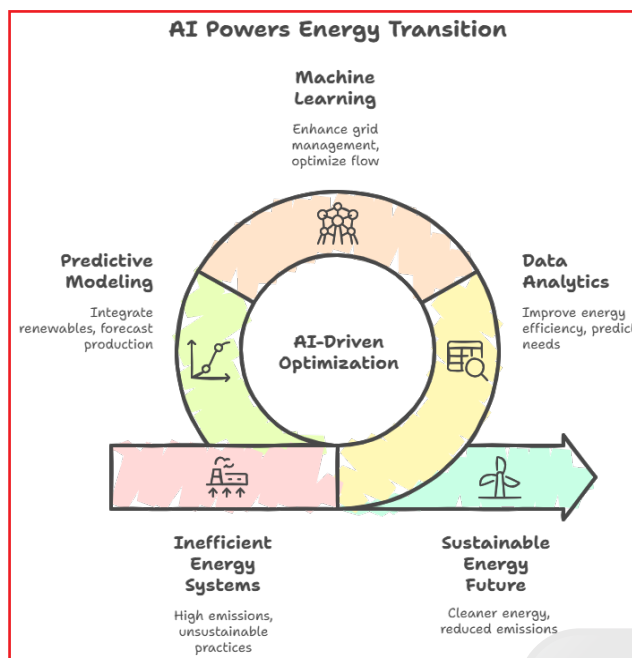


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## What Role can Artificial Intelligence Play in India's Energy Transition?

💡 **Enhancing Grid Operations and Renewable Energy Integration:** AI is crucial for optimizing grid operations as India scales up renewable energy integration.

- ✦ With increasing **renewable energy capacity**, especially solar and wind, their intermittent nature can cause grid instability. AI technologies can predict energy production and demand fluctuations, enabling better grid management and reducing reliance on fossil fuels.
- ✦ For instance, in a pilot project in **Gujarat**, **AI-driven models reduced the gap between predicted and actual solar power generation by 30%**, helping grid operators optimize energy distribution.

💡 **Improving Energy Efficiency through Demand-Side Management:** AI can revolutionize energy efficiency by enabling real-time demand-side management.

- ✦ This is critical for India's grid, which is **under pressure from a rapidly growing population and industrialization**.

- ✦ AI-driven systems can adjust energy supply based on real-time usage patterns, optimizing consumption and minimizing peak load strain.
- ✦ For instance, **ABB Ability Energy Forecasting uses AI to give facility managers accurate power consumption predictions**.
  - ✍ Energy Forecasting enables them to take timely action to reduce unplanned consumption spikes by re-scheduling or switching off non-critical loads
- ✦ Also, **AI's predictive maintenance capabilities** are vital for reducing the high **transmission and distribution (T&D) losses**, which reach up to 20% in India.

💡 **AI-Driven Scaling of Renewable Energy Production:** AI can help India scale its renewable energy production by optimizing the performance of solar panels and wind turbines. By analyzing weather patterns and operational data, AI can fine-tune system operations to enhance energy output.

- ✦ For instance, **Machine learning has boosted the value of our wind energy by roughly 20%**, compared to the baseline scenario of no time-based commitments to the grid.
- ✦ Also, **Google's AI subsidiary DeepMind** has developed a machine learning algorithm to predict the productivity of wind farms up to **36 hours in advance**.

💡 **AI for Climate Impact Mitigation and Carbon Emissions Reduction:** As India strives to meet its carbon reduction goals under the Paris Agreement, **AI is a key enabler in identifying emission hotspots and developing strategies** for minimizing them.

- ✦ By analyzing vast amounts of environmental data, AI can pinpoint inefficiencies across industries, cities, and energy sectors, offering solutions to reduce **carbon footprints**.
- ✦ A recent report from **McKinsey** reveals that AI-driven technologies can help businesses **reduce their CO<sub>2</sub> emissions by up to 10% and cut energy costs by 10-20%**, significantly aiding India's net-zero target by 2070.

💡 **AI for Decentralized Renewable Energy Systems:** As India moves towards decentralizing its energy

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infrastructure, AI can play a crucial role in **optimizing distributed renewable energy systems**, such as rooftop solar panels, small wind turbines, and microgrids.

- ✦ AI algorithms can **monitor and manage these decentralized energy sources in real time**, ensuring optimal energy production, consumption, and storage.

- ✦ In **rural areas, where grid connectivity is limited**, AI can help microgrids operate **autonomously by analyzing local weather patterns** and energy needs.

- ✎ For example, **time is not far when a microgrid in a village in Uttar Pradesh uses AI to automatically adjust energy generation and consumption**, ensuring a stable power supply without depending on the main grid.

💡 **AI in Electric Vehicle (EV) Integration and Charging Networks:** The rapid adoption of electric vehicles in India can be significantly enhanced by AI.

- ✦ AI technologies can **optimize the charging infrastructure, ensuring efficient distribution of power to EV charging stations** across the country.

- ✦ AI can predict the best times for EVs to charge based on **grid demand, renewable energy availability, and user behavior**.

- ✎ Additionally, **AI can aid in balancing the load on the grid by shifting charging times to off-peak hours** or during high renewable energy output, reducing the strain on the grid.

- ✎ For instance, in cities like **Bengaluru**, AI-based EV charging networks can successfully minimize grid congestion during peak hours, while ensuring that EVs are charged efficiently and sustainably.

### What are the Key Issues Associated with AI Integration in Energy Transition?

💡 **Data Quality and Availability for AI Training:** AI systems heavily rely on large, high-quality datasets to function effectively. However, India's energy

sector faces significant challenges regarding data availability, accuracy, and consistency. Many regions still lack proper data collection mechanisms, limiting AI's potential in energy management.

- ✦ Many smart grid and renewable energy projects in rural areas face difficulties in gathering real-time data due to outdated infrastructure.

- ✦ Out of the **14.8 million Distribution Transformers (DTs)** under state power distribution companies (discoms), **only 35% have been approved for smart metering**.

- ✎ Also, as per data from the **Revamped Distribution Sector Scheme (RDSS)** portal, only about 0.44 million DTs (**3% of the total**) currently have smart meters functioning in communicating mode.

💡 **Skill Shortage in AI and Data Analytics:** The lack of AI and data analytics expertise is a major bottleneck for the effective implementation of AI solutions in India's energy transition.

- ✦ As the demand for AI professionals outpaces supply, this skill gap is critical to the success of AI-powered energy solutions.

- ✦ **India's renewable energy sector has faced challenges in deploying AI effectively** due to a lack of professionals who can develop, implement, and maintain AI-based systems.

- ✎ India is experiencing a significant AI talent shortage, with **just one Generative AI (GenAI) engineer available for every 10 open positions**, and only 49% of the overall demand currently being met, according to a report.

💡 **Cybersecurity and Data Privacy Concerns:** With AI systems handling sensitive data across energy grids, there are heightened concerns regarding cybersecurity and data privacy.

- ✦ As more data points are generated by AI-driven smart grids, the risk of cyberattacks grows, potentially compromising the entire energy infrastructure.

- ✦ For instance, there have already been reports of **cyberattacks targeting India's power grid**,

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notably one involving a group called “RedEcho” potentially linked to the Chinese government, highlighting vulnerabilities in the system.

- ✦ Also, in early 2024, an **espionage campaign aimed at the Indian energy sector was uncovered**, utilizing modified malware to collect sensitive data

💡 **Regulatory and Policy Gaps:** India’s regulatory framework for AI deployment in the energy sector remains underdeveloped, hindering the full-scale adoption of AI.

- ✦ As AI technologies evolve faster than regulatory bodies can keep up, there’s a risk of uncoordinated or inefficient AI integration in energy systems.
- ✦ The **Indian government has yet to develop comprehensive guidelines for AI’s role in energy forecasting and grid management**, causing uncertainty among stakeholders.
- ✦ For instance, during FY 2020–21, **solar and wind contributed approximately 29% of Karnataka’s annual electricity generation, 20% in Rajasthan, 18% in Tamil Nadu, and 14% in Gujarat**. However, these states lack an adequate regulatory framework for the integration of Artificial Intelligence (AI) in the energy sector.

💡 **Environmental Impact of AI Energy Consumption:** AI systems, especially those using deep learning and machine learning models, itself require significant computational power, leading to increased energy consumption.

- ✦ In a country like India, **where energy demand is already rising rapidly, this additional consumption could offset the environmental benefits of AI in energy systems**.
- ✦ Training an AI model for energy forecasting can consume more electricity than some small cities use in a year, raising concerns over AI’s environmental footprint.
- ✦ A study by the **International Energy Agency (IEA)** reveals that electricity demand from data centres for AI worldwide is set to more than double by **2030 to around 945 terawatt-**

**hours (TWh), slightly more than the entire electricity consumption of Japan today**, a concerning figure for India’s sustainability goals.

💡 **Integration Challenges with Legacy Infrastructure:** India’s existing energy infrastructure is outdated and incompatible with the latest AI technologies, creating significant integration challenges.

- ✦ AI requires **modern, interoperable systems, and without upgrades to legacy grids**, many regions will be unable to harness AI’s full potential in energy optimization.
- ✦ In areas with older grid systems, **AI integration faces major hurdles, such as inefficient communication between devices**, limiting the effectiveness of AI in energy management.
- ✦ Currently, **India requires an investment of approximately ₹2,442 billion** in grid expansion and related infrastructure, which makes AI integration secondary.

### What Measures can India Adopt to Effectively Integrate AI in India’s Energy Transition?

💡 **Create a National AI and Energy Innovation Framework:** India should develop a national AI strategy specific to the energy sector, encompassing clear guidelines and an **action plan for AI integration across all stages of energy production, storage, distribution, and consumption**.

- ✦ This framework should establish standardized protocols for **AI deployment, data sharing, and interoperability among energy players** (e.g., utilities, government bodies, and tech firms).
- ✦ By institutionalizing this framework, India can ensure consistent policy guidance and an innovation-driven AI ecosystem.

💡 **Leverage AI for Predictive Grid Management and Smart Load Balancing:** India’s grid suffers from inefficiencies, outages, and heavy congestion during peak demand.

- ✦ AI can be **used for predictive grid management, utilizing machine learning models to forecast power demand and supply**, thus enabling operators to manage grid loads dynamically in real-time.

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- ✦ AI-driven smart load balancing tools can **anticipate fluctuations in renewable energy generation (wind/solar) and adjust energy flows accordingly**, reducing power disruptions.
- 💡 **Establish a Nationwide Smart Meter Rollout with Polite AI Integration:** India can fast-track the adoption of smart meters and **some equipped with AI capabilities for real-time energy consumption monitoring**.
  - ✦ By collecting granular data, AI can optimize consumption patterns, offer predictive maintenance, and manage peak loads more effectively.
  - ✦ **Implementing these smart meters across urban and rural areas will provide valuable data for utilities and consumers**, helping to reduce transmission losses and energy wastage.
- 💡 **AI-Driven Renewable Energy Forecasting System:** AI can be utilized to create a centralized, cloud-based renewable energy forecasting platform, enabling more accurate predictions of solar, wind, and hydro generation.
  - ✦ The system would use weather data, historical generation patterns, and **machine learning models to provide short-term (hourly, daily) and long-term (seasonal) forecasts**.
  - ✦ These forecasts can help grid operators optimize energy dispatch and integrate renewables more smoothly, reducing reliance on fossil fuels.
- 💡 **Invest in AI-Driven Decentralized Microgrids for Rural Electrification:** AI can transform rural electrification by deploying microgrids that utilize AI for real-time energy management, predictive maintenance, and autonomous fault detection.
  - ✦ These AI-powered systems can **integrate local renewable sources (e.g., solar, biomass) and store excess energy in batteries for later use**.
  - ✦ The use of AI in microgrids allows for the decentralized and sustainable management of energy in remote areas, bypassing the need for extensive grid infrastructure.
- 💡 **Private Sector Partnerships to Develop AI-Enabled Smart Energy Solutions:** The Indian government should incentivize private companies and startups to develop AI-powered energy solutions, such as **smart thermostats, predictive maintenance tools, and energy optimization platforms for industries**.
  - ✦ This can be achieved through tax benefits, funding for R&D, and creating innovation hubs in collaboration with universities and tech giants.
  - ✦ Encouraging private-public partnerships will accelerate the scaling of AI-based solutions in diverse areas such as demand-side management, energy efficiency, and green building technologies.
- 💡 **Develop AI for Real-Time Energy Theft Detection and Fraud Prevention:** AI systems can be employed to detect anomalies and prevent energy theft, which is a significant issue in India, especially in rural and underprivileged urban areas.
  - ✦ AI-powered systems can **analyze consumption patterns and flag unusual activity that might indicate theft or fraud**.
  - ✦ By implementing AI for real-time monitoring, utilities can reduce energy losses, ensure accurate billing, and improve overall revenue collection.
- 💡 **AI Research and Development Hub Focused on Energy Transition:** India should invest in creating AI-focused R&D hubs within its leading energy institutes, such as the **National Institute of Solar Energy (NISE) and the Indian Institute of Technology (IITs)**.
  - ✦ These hubs would focus on developing AI-driven solutions tailored to India's energy transition, such as energy-efficient technologies, solar optimization, smart grid systems, and emissions reduction techniques.
  - ✦ By fostering innovation in energy AI, India can lead the way in creating low-carbon energy systems.
- 💡 **Implement AI-Enabled Regulatory Oversight and Grid Cybersecurity:** As AI systems manage increasingly complex energy operations, **the need for robust cybersecurity is paramount**.

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✦ India should implement AI-driven regulatory frameworks that enable continuous monitoring of **AI systems' performance, security vulnerabilities, and compliance with energy regulations.**

✦ Furthermore, AI should be used to protect energy infrastructure from cyberattacks by detecting threats in real-time and responding autonomously to safeguard critical assets.

### Conclusion:

AI has the potential to revolutionize India's energy sector, driving the country toward its ambitious sustainability goals. By investing in AI-driven solutions for grid management, renewable energy integration, and decentralized energy systems, India can create a more efficient, resilient, and sustainable energy future. This approach will directly contribute to achieving **SDG 7 (Affordable and Clean Energy)**, **SDG 9 (Industry, Innovation, and Infrastructure)**, and **SDG 13 (Climate Action)** by enhancing energy access, fostering innovation, and mitigating climate change.

## India'S Diplomatic Shift to Latin America

*This editorial is based on "[Why India must have a standalone LatAm policy](#)" which was published in The Hindustan Times on 14/07/2025. The*

*article brings into picture the growing strategic shift in India's diplomacy towards Latin America, highlighting efforts to deepen ties with the region as part of a broader push for diversified global engagement and South-South cooperation.*

**Tag:** GS Paper - 2, Bilateral Groupings & Agreements, Groupings & Agreements Involving India and/or Affecting India's Interests, International Treaties & Agreements

Indian Prime Minister's recent **multi-nation visit to Brazil, Argentina, and other Latin American countries** signals a pivot towards building stronger ties with this resource-rich region. The existing trade dynamics reveal both opportunity and imbalance - **while India ranks as Brazil's ninth-largest trading partner**, Brazil sits much lower on India's priority list, indicating vast untapped potential. This evolving relationship reflects India's broader ambition to diversify its international partnerships beyond conventional allies and neighbors, **positioning itself as a key player in South-South cooperation.**



### How India-Latin America Relations Evolved Over Time?

#### 💡 Early Historical Engagement (Pre-1947)

✦ **Shared Colonial Legacy:** Both **India and Latin America** shared a colonial history, though India was under British rule and Latin

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American countries were mostly colonized by Spain and Portugal.

- ✦ **Limited Engagement:** During this period, there was minimal diplomatic or economic interaction, with India focusing on its struggle for independence and Latin America dealing with its post-colonial challenges.

#### 💡 Post-Independence Period (1947-1970s)

- ✦ **Non-Aligned Movement (NAM):** After India's independence in 1947, both India and many Latin American nations embraced **non-alignment during the Cold War**.

✍ This common ground led to occasional cooperation in international forums.

- ✦ **Political Cooperation:** India supported Latin American countries in their efforts to reduce Western influence and gain autonomy in global politics, but trade and diplomatic relations remained limited.

✍ In 1968, **Prime Minister Indira Gandhi** made a significant diplomatic push by visiting eight Latin American and Caribbean nations.

✍ This marked a strong assertion of India's diplomatic engagement with the region, emphasizing solidarity with the **Third World and promoting peaceful cooperation and integration**.

#### 💡 Economic Liberalization and Growth (1990s)

- ✦ **Opening Up of India's Economy:** India's economic liberalization in the early 1990s sparked greater interest in expanding trade ties with Latin America, as both regions sought new economic opportunities outside traditional partners like the US and Europe.

- ✦ **Increased Trade and Investment:** Bilateral trade grew, particularly with **Brazil and Argentina**, driven by India's demand for raw materials like oil and Latin America's interest in India's technological expertise and pharmaceutical exports.

✍ India signed trade agreements with seven LAC nations and launched the **FOCUS LAC Program in 1997** to enhance exports and economic collaboration.

#### 💡 21<sup>st</sup> Century Engagement (2000s-Present)

- ✦ **Preferential Trade Agreement:** The **Preferential Trade Agreement between MERCOSUR and India** entered into force in **2009**, fully or partially eliminating import tariff for most energy products

- ✦ **High-Level Diplomatic Engagement:** Prime Minister Modi's 2014 visit to Brazil for the **BRICS summit** was a significant turning point, setting the stage for stronger ties.

✍ **India's External Affairs Minister S Jaishankar's** continued engagement with Latin America, including multiple visits since becoming EAM, highlights India's renewed commitment to deepening relations.

- ✦ **Strategic Partnerships:** India focused on strengthening relations with key countries such as **Brazil, Mexico, and Argentina**, as well as participating in multilateral forums like **BRICS and G20**.

#### 💡 Current Focus and Future Prospects (2020s and Beyond)

- ✦ **Diversification of Partnerships:** India is now focused on diversifying its global relationships, with Latin America playing a crucial role in India's pursuit of economic and strategic autonomy.

✍ The current phase is characterized by deepening cooperation in areas like **renewable energy, technology, defense, and food security**, with both regions aiming to strengthen their economic ties through free trade agreements (FTAs) and enhanced diplomatic engagement.

### What is the Significance of Latin America for India?

- 💡 **Strategic Economic Diversification:** Enhanced cooperation with Latin America allows India to diversify its **trade and investment portfolio**, reducing dependency on traditional economic partners like the **US and China**.

- ✦ In 2023-24, **India's trade with Latin America reached \$35.73 billion**, with exports

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amounting to \$14.50 billion, indicating a growing economic tie.

- ✦ The growing trade volume, **targeting \$100 billion by 2025 (with Latin American and Caribbean countries)**, demonstrates the region's importance in India's global strategy.

💡 **Energy Security:** Latin America holds strategic importance for India's energy security by providing stable and diverse sources of crude oil and renewable energy.

- ✦ This cooperation **reduces India's reliance on the Middle East and Russia**, especially in light of global energy fluctuations.
- ✦ **India imports roughly 15% to 20% of its crude oil from Latin America**, including key suppliers like Brazil and Mexico.
- ✦ In a recent development, **Chile's Codelco, the world's largest copper producer**, is set to supply copper concentrate to India's Adani Group for its **Kutch Copper smelter in Gujarat**.

💡 **Technological and Industrial Cooperation:** Latin America is increasingly becoming a partner in technology transfer, especially in renewable energy, pharmaceuticals, and IT sectors, aligning with India's economic interests.

- ✦ India's expertise in IT and pharmaceuticals complements Latin America's need for technological innovation.
- ✦ In Latin America, micro, small, and medium enterprises represent more than **99.5% of the business fabric** that India can tap on.
  - 📎 Indian IT companies employ over **40,000 locals in Latin America**, underscoring the region's importance in India's technological expansion.

💡 **Geopolitical and Strategic Alliances:** Strengthening ties with Latin America also enhances India's geopolitical standing, especially in countering China's growing influence in the region.

- ✦ For example, **India's engagement with Argentina and Brazil through multilateral forums like BRICS and G20** solidifies its position in global governance.

- ✦ The shared focus on **"Active Non-Alignment" in global geopolitics**, particularly on issues like the **Ukraine war**, strengthens India-Latin America relations.

💡 **Cultural and People-to-People Exchanges:** Increased cooperation between India and Latin America promotes cultural diplomacy, fostering deeper people-to-people ties and enhancing soft power.

- ✦ Latin American nations have significant interest in Indian culture, exemplified by the **popularity of Bollywood and yoga**.
- ✦ This is reflected in growing cultural exchanges, such as the **Indian Super League hosting more Latin American football players** and India's growing involvement in the Latin American entertainment industry.

📎 Latin American actors are appearing in Indian films, like **actress Barbara Mori in "Kites"**.

- ✦ Such exchanges help bridge social and cultural gaps, further strengthening bilateral relations.

💡 **Agricultural and Food Security Cooperation:** Latin America is a key partner in addressing India's food security concerns, providing vital agricultural products like **edible oils and pulses**.

- ✦ The recent shift in edible oil imports due to the war in Ukraine saw Latin America stepping in to fill the gap, with Brazil and Argentina increasing their exports to India.
- ✦ **In 2022, India's imports of edible oils from Latin America surged to \$5.6 billion**, highlighting the region's growing role in India's agricultural supply chain.

📎 This cooperation is crucial for maintaining stable food prices and ensuring food security in India.

💡 **Sustainable Development and Green Energy Transition:** Latin America's experience in **sustainable agriculture, renewable energy, and climate resilience** presents valuable learning opportunities for India.

- ✦ Joint ventures in **solar energy, lithium extraction, and biofuels** can contribute to both regions' green energy ambitions.

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- ✦ India is already collaborating with Brazil and other Latin American nations on the **International Solar Alliance (ISA)**, working together to address climate change and energy security.

✎ Furthermore, **Chile's leadership in lithium production and India's interest in clean energy solutions** position both regions as partners in driving a global green transition.

### What are the Key Issues Hindering Effective India-Latin America Relations?

💡 **Geographical Distance and Connectivity Challenge:** While physical distance has always been a barrier, the lack of direct connectivity between India and Latin America remains a key issue.

- ✦ **Limited shipping routes and aviation links** hinder smoother trade and travel, slowing down bilateral engagement.

- ✦ For instance, the **absence of direct flights between major cities like New Delhi and Buenos Aires** restricts business travel and reduces the frequency of high-level exchanges.

💡 **Perceptions and Lack of Awareness:** While Latin Americans often view India as a land of spiritualism, many Indians still see the region through the lens of **"banana republics" and political instability**.

- ✦ This cultural and informational gap limits deeper collaboration. For instance, despite India's emerging role in global IT and pharmaceuticals, **Latin Americans remain underexposed to India's technological prowess**, a gap evident in India's pharmaceuticals exports, which still face competition from China despite India's stronger position.

💡 **Economic Infrastructural Gaps:** Inadequate infrastructure, both in terms of physical connectivity and financial systems, limits the potential of trade and investment between India and Latin America.

- ✦ Despite recent trade improvements, **only certain Latin American countries (like Brazil and Mexico) benefit from robust trade with India**, leaving many other nations behind.

- ✦ The 2022 data reveals that Brazil accounts for the majority of trade with **Brazil's exports to India reaching USD 6.43 billion**, growing at an annual rate of 5.68% since 2017.

✎ But countries like **Panama and Guatemala** have much smaller shares, hampered by insufficient trade facilitation mechanisms.

💡 **Inconsistent Political Will and Engagement:** While both sides show interest in stronger ties, there is a lack of consistent political engagement.

- ✦ For example, India's political leadership has not prioritized Latin America as part of its regular foreign policy agenda.

- ✦ Despite Prime Minister Modi's 2014 visit to Brazil for BRICS, no subsequent high-level visits have taken place.

- ✦ This disconnect is **mirrored by the fact that only five Latin American leaders have visited India since 2014**, illustrating the gap in sustained diplomatic efforts and further delaying economic agreements.

💡 **Trade Barriers and Protectionist Policies:** High trade tariffs, especially on agricultural products from Latin America, create obstacles to expanding trade between India and the region.

- ✦ While Latin America seeks to upgrade preferential trade agreements (PTAs) to **full-fledged FTAs**, India has yet to respond with clear political will to reduce these barriers (though this can be a significant agenda of the Prime Minister's recent visit).

✎ With **India's trade policies still focused on protectionism in sectors like agriculture**, the full potential of Latin America remains untapped.

💡 **Competition from China:** China's growing influence in Latin America presents a direct challenge to India's ambitions in the region.

- ✦ While India is a partner in sectors like pharmaceuticals and IT, China's strategic investments in infrastructure and trade have made it the dominant economic force in Latin America.

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✦ Latin American nations like **Brazil and Chile** now **prioritize China** as their **top trading partner**, which undermines India's competitiveness.

✍ In recent years, China's trade with Latin America reached \$427.4 billion, dwarfing India's \$35 billion, and Beijing has secured large infrastructure deals that India has not been able to match, **especially with projects like the Central Bi-Oceanic Railway Corridor**.

💡 **Limited Multilateral Engagement:** India's engagement in regional forums like the **Pacific Alliance or the Community of Latin American and Caribbean States (CELAC)** has been sporadic and lacks depth.

✦ This absence from key multilateral platforms hampers India's ability to forge strong, collaborative relationships on larger regional issues like climate change and sustainable development.

✦ Although **India is an observer in the Pacific Alliance**, the absence of concrete agreements or active participation in such forums weakens its standing in the region, as seen in the **sluggish progress of trade talks with the Pacific Alliance**.

💡 **Cultural and Language Barriers:** Language and cultural differences further complicate business and diplomatic exchanges.

✦ While English is widely spoken in India, **Latin American countries predominantly speak Spanish and Portuguese**, making communication and partnership more difficult.

✦ This gap is evident in the **limited number of Indian professionals fluent in Spanish and Portuguese**, restricting India's ability to penetrate deeper into the Latin American market.

✍ Despite recent efforts to increase cultural exchange, these barriers still pose significant challenges in engaging Latin American countries effectively.

## What Measures India Can Adopt to Enhance Ties with Latin America?

💡 **Establishing Direct Connectivity and Infrastructure Development:** India should prioritize the establishment of **direct air and maritime links between key Indian cities and major Latin American capitals**.

✦ Improving logistics infrastructure, including ports and trade hubs, would reduce transportation costs and facilitate smoother trade and diplomatic exchanges.

✦ **India can work with Latin American countries to develop a shared transport corridor**, enabling faster and cost-efficient movement of goods, fostering deeper economic integration.

💡 **Strengthening Political and Diplomatic Engagement:** A more consistent and strategic diplomatic outreach is required, including high-level visits by Indian leaders to Latin America and vice versa.

✦ By engaging more actively in multilateral forums like **CELAC and the Pacific Alliance**, India can increase its visibility and influence.

✦ Regular diplomatic dialogues and establishing a dedicated **"Latin American Desk" within the Ministry of External Affairs** would ensure sustained and focused attention on this region.

💡 **Fostering Comprehensive Trade Agreements:** India should actively **negotiate and implement Free Trade Agreements (FTAs)** with key Latin American countries and regional groups like **Mercosur**.

✦ By prioritizing sectors where both regions have complementary strengths, such as renewable energy, technology, and pharmaceuticals, India can create mutually beneficial trade dynamics.

✦ Additionally, **expanding preferential trade agreements (PTAs) to encompass a wider array of industries** will unlock new trade avenues and deepen economic cooperation.

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💡 **Expanding Educational and Cultural Diplomacy:** India should invest in cultural diplomacy to build deeper people-to-people connections.

✦ This could include scholarships, cultural exchanges, and academic collaborations focused on subjects like **renewable energy, information technology, and global governance**.

✦ By increasing the number of Latin American students in Indian institutions and vice versa, India can foster a more nuanced understanding of its culture and global ambitions, paving the way for long-term soft power influence.

✦ The Indian communities in countries like **Guyana, Trinidad, and Tobago** can act as cultural and economic bridges.

📌 India should establish more formal mechanisms to engage this diaspora, empowering them to facilitate business and cultural exchanges while promoting India's strategic and economic interests in the region.

💡 **Boosting Collaborative Research and Innovation:** India can partner with Latin American nations in research and innovation, particularly in the fields of **sustainable agriculture, renewable energy, and coastal management**.

✦ Creating **joint research platforms, innovation hubs, and incubators for startups** in both regions will encourage cross-border collaboration.

✦ This approach not only addresses common global challenges but also positions both regions as leaders in solving issues of climate resilience and energy transition.

💡 **Enhanced Digital and Technological Cooperation:** India should focus on increasing its technological footprint in Latin America through joint ventures and strategic partnerships in areas like **digital infrastructure, cybersecurity, and artificial intelligence**.

✦ Setting up digital training centers and technology parks in Latin American countries would not only benefit local economies but

also **enhance India's role as a global tech leader**.

✦ Promoting India's expertise in IT services and solutions can drive future economic growth and open new markets for Indian tech firms.

💡 **Engaging in South-South Cooperation Frameworks:** India can enhance its leadership role in South-South cooperation by actively promoting joint development programs and initiatives tailored to the needs of Latin American countries.

✦ These collaborations could focus on areas like **health, education, poverty alleviation, and sustainable development**, fostering deeper diplomatic ties while simultaneously addressing pressing global challenges.

✦ **India's leadership in global forums like the BRICS and G20 should be leveraged to promote Latin America's interests** and integrate their developmental priorities into India's foreign policy strategy.

💡 **Strengthening Security and Defense Cooperation:** India can expand its strategic defense ties with Latin American nations, especially in areas such as **counter-terrorism, maritime security, and disaster management**.

✦ Joint military training, collaborative defense technology projects, and information-sharing mechanisms can create stronger defense partnerships.

✦ **India's expertise in cyber defense and counterinsurgency operations** can be shared with Latin American countries, addressing regional security challenges while strengthening bilateral ties in a multidimensional manner.

## Conclusion:

While Latin America's geographical distance from India has traditionally posed challenges, the evolving landscape of global logistics and communication presents a promising opportunity to overcome this barrier. As **S. Jaishankar** wisely notes, ***"We live in a globalized era and we must now make sure that distance is no longer an impediment. Modern logistics offer us collaborative***

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*possibilities and so do modern communications.”* With strategic investments in infrastructure and diplomatic will, both regions can enhance connectivity and create mutually beneficial pathways for economic, cultural, and strategic collaboration.

## Rethinking India's Higher Education Model

*This editorial is based on “Fixing higher education: Research quality, soft skills gap, and NEP 2020 reforms” which was published in The Hindu on 15/07/2025. The article brings into focus the pressing challenges facing India's higher education—declining academic standards, poor soft skills, and growing commercialization.*

**Tag:** GS Paper - 2, Education, Welfare Schemes, Issues Related to Children, Human Resource, Skill Development, Government Policies & Interventions

**India's higher education system** stands at a pivotal crossroads, facing challenges of **declining academic rigor, inadequate soft skills training, and growing commercialization**. Once rooted in strong fundamentals and guided mentorship, today's institutions often prioritize rankings and revenue over quality and purpose. Though the **National Education Policy (NEP) 2020** offers a progressive framework, its uneven implementation raises concerns. A **strategic reorientation**—anchored in foundational excellence, ethical leadership, and institutional integrity—is essential to revitalize the sector.

### What are the Key Developments in India's Higher Education System?

- 💡 **Expansion of State Public Universities (SPUs) and Inclusive Access:** India's commitment to expanding its higher education network has been significantly demonstrated through the growth of **State Public Universities (SPUs)**, which have become central to making education more accessible, particularly in underserved and rural areas.
  - ✦ The SPUs, **accounting for 81% of total student enrollments**, are crucial in improving higher education access, providing millions of students, especially from disadvantaged communities.

- ✦ These **universities now serve over 3.25 crore students**, reflecting an inclusive approach that aligns with the **National Education Policy (NEP) 2020's ambitious target of doubling enrollments by 2035**.

- 💡 **Substantial Growth in Research Output and Global Recognition:** India's research ecosystem has seen a transformative rise, with the **nation's contribution to global research increasing from 3.5% in 2017 to 5.2% in 2024**.

- ✦ This leap in research output is largely attributed to institutions like IITs, which contribute over **24% of the country's research publications**.

- 💡 **Internationalization and Global Collaborations:** India is making significant strides towards internationalizing its higher education system, as evidenced by initiatives like the **“Institutes of Eminence” scheme**, which provides increased autonomy and funding to select institutions.

- ✦ This initiative aims to bring Indian universities into the global elite, thereby raising their rankings and enhancing academic collaborations.

- ✦ Additionally, **India's increasing partnerships with leading international universities, through faculty exchanges, joint research programs, and student collaborations**, are fostering an environment of cross-border knowledge-sharing.

- ✦ Initiatives like **IIT Madras Zanzibar Campus** have the potential to position India as a prominent player in the global education and research arena.

- 💡 **Digitalization and Online Education:** The surge in digital education, propelled by initiatives like **DIKSHA (Digital Infrastructure for Knowledge Sharing)** and the **National Digital Library**, marks a pivotal development in India's higher education.

- ✦ These digital platforms have enabled millions of students to access quality learning resources, particularly during the pandemic, and have bridged gaps in physical infrastructure.
- ✦ The **move towards hybrid learning models is helping students gain knowledge at their**

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own pace, improving the quality and reach of education.

💡 **Progress in Gender Parity and Inclusivity:** India has made remarkable strides in achieving gender parity in higher education, with the **Gender Parity Index (GPI)** rising from 0.87 in 2011-12 to 1.01 in 2021-22.

- ✦ This achievement reflects concerted efforts to encourage the participation of women in higher education, with more women enrolling in traditionally male-dominated fields like **engineering and technology. (43% of India's STEM graduates are women)**
- ✦ Moreover, marginalized communities, including **Scheduled Castes (SCs), Scheduled Tribes (STs), and Other Backward Classes (OBCs),** have seen significant enrollment growth, improving the inclusivity of India's higher education system.

💡 **Surge in Private Universities:** Private universities in India have witnessed a significant expansion, with enrollments growing by **497% between 2011-12 and 2021-22.**

- ✦ This surge in private institutions is helping **alleviate pressure on public universities** and offers students a wider range of educational opportunities.
- ✦ This development is crucial in diversifying India's higher education landscape and catering to the growing demand for tertiary education. However, this growth is also accompanied by concerns regarding the affordability and quality of education.

💡 **Financial Investments and Infrastructure Upgrades:** India's increasing investments in higher education infrastructure, as seen through initiatives like the **Higher Education Financing Agency (HEFA),** are vital for improving campus facilities and academic resources.

- ✦ These investments are aimed at upgrading laboratories, libraries, and digital infrastructure to support the growing student population.
- ✦ In 2021, **India allocated 1.57% of its GDP to higher education (tertiary),** a step towards

meeting the NEP 2020's call to boost public investment.

- 🔗 However, sustained investment in infrastructure remains crucial for sustaining growth in this sector.

### What are the Key Issues Associated with India's Higher Education System?

💡 **Quality vs. Quantity Dilemma in Expansion:** India's higher education system has expanded rapidly, but this has often come at the expense of quality.

- ✦ The pressure to accommodate a growing student population has led to overcrowded classrooms, a shortage of qualified faculty, and declining academic standards.
- ✦ For instance, in 2021, **600 out of 1,043 universities and 25,000 of over 40,000 colleges were not accredited.**

- 🔗 While **enrollments have surged by 21%,** infrastructure and faculty development have lagged behind, undermining the true potential of higher education.

💡 **Faculty Shortages and Inadequate Professional Development:** India continues to face significant faculty shortages across most academic institutions, hindering the quality of education and research output.

- ✦ Leading institutions like **IITs and IIMs have vacancies of 40% and 31%,** respectively, reflecting a systemic problem.
- ✦ Faculty recruitment is delayed due to **bureaucratic hurdles, while many positions remain unfilled,** forcing universities to rely on part-time or contract staff **(as seen in University of Delhi).**

- 🔗 This shortage stifles innovation, research, and personalized mentoring, thus affecting the quality of student outcomes.

💡 **Inequality in Access and Regional Disparities:** Access to quality higher education in India remains unequal, with stark regional and socio-economic disparities.

- ✦ Despite a rise in **Gross Enrollment Ratio to 28.4% in 2021-22,** students in rural areas,

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economically disadvantaged groups, and certain states still struggle with limited opportunities.

- ✦ For instance, **Uttar Pradesh, Maharashtra, and Tamil Nadu account for the highest number of enrollments**, leaving states like **Bihar and Odisha behind**.

✎ This disparity in access not only affects enrollment rates but also limits equitable participation in national development.

#### 💡 **Outdated Curriculum and Lack of Industry**

**Alignment:** India's higher education curriculum is often criticized for being outdated and not aligned with the rapidly evolving job market.

- ✦ A significant gap exists between what is taught in institutions and the skills required by the industry.
- ✦ Only **51.25% of the country's youth is deemed employable (Economic Survey 2023-24)**, indicating a mismatch between academic output and market demands.
- ✎ The growing emphasis on **AI, ML, and Data Science** needs to be reflected in curriculum revisions, yet only a few institutions have implemented industry-oriented programs effectively.

#### 💡 **Research Gaps and Lack of Innovation:** India has made progress in research output, but the country still **lags behind global standards in terms of research quality and innovation**.

- ✦ India's research contribution to global publications grew from 3.5% in 2017 to 5.2% in 2024, however, **research spending is just 0.7% of GDP**, far below the **2-3% benchmark seen in countries like the U.S. and South Korea**.
- ✦ Research at many institutions is fragmented, and the **focus often remains on quantity (publications) rather than quality or societal impact**, limiting India's potential as a global leader in innovation.

#### 💡 **Bureaucratic Interference and Governance Issues:** Excessive government control and bureaucratic

interference have weakened the autonomy of India's higher education institutions.

- ✦ Despite the NEP 2020 calling for more autonomy, **many institutions remain heavily influenced by political appointments** and administrative red tape.
- ✦ Recent issues, such as the **controversial appointment process for vice-chancellors and faculty**, highlight systemic governance flaws.

✎ The centralization of power often leads to inefficiency and stifles innovation and academic freedom.

#### 💡 **Inadequate Internationalization and Outflow of Talent:** India's higher education system has struggled to attract international students.

- ✦ While the number of Indian students studying abroad has reached a massive 1.8 million in 2025, **only 46,000 foreign students are enrolled in India**.
- ✦ This reflects a significant gap in the global appeal of Indian institutions, which often fail to compete with international counterparts in terms of faculty quality, infrastructure, and academic reputation.
- ✎ This **outflow of talent also contributes to a "brain drain,"** as Indian students seek **better opportunities abroad**, further depleting the country's human capital.

#### 💡 **Mental Health and Student Stress:** The high-stakes nature of India's entrance exams has led to a surge in student stress and mental health issues.

- ✦ **Over 35% of recorded suicides in India occur in the 15-24 age group**, with academic pressure being a leading cause.
- ✦ The system's focus on rote learning and intense competition exacerbates this issue, leading to burnout among students.
- ✎ Efforts to reform academic assessments and provide better mental health support are essential to create a healthier educational environment.

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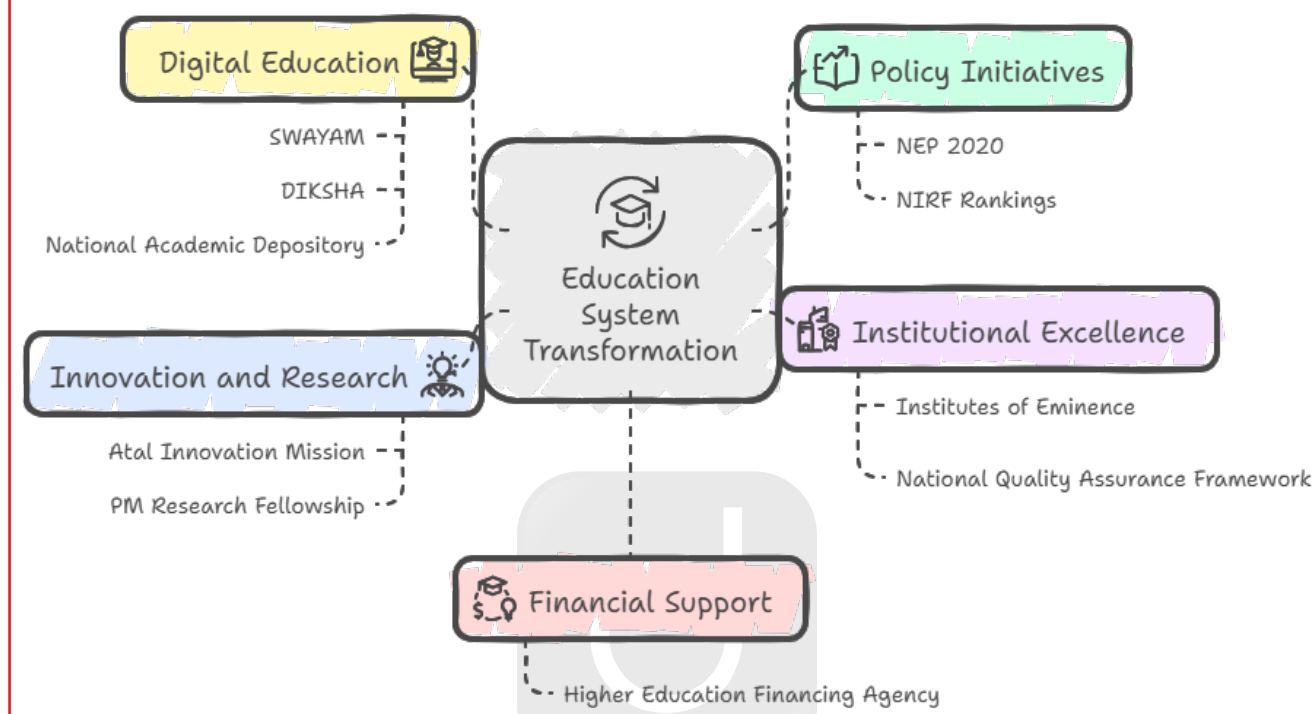
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## Transforming India's Higher Education System



### What Measures can India Adopt to Enhance the Higher Education System?

- 💡 **Strengthening Faculty Recruitment and Development Programs:** India must prioritize the **recruitment of high-quality faculty across all universities and institutes.**
  - ✦ This involves not only reducing bureaucratic delays in hiring but also ensuring that faculty development programs are robust, including regular workshops, international fellowships, and research collaboration opportunities.
  - ✦ A **national centralized recruitment body for higher education could standardize the process**, ensuring transparency and meritocracy.
    - 💡 Additionally, incentives for faculty to engage in cutting-edge research and innovation will foster an ecosystem of academic excellence.
- 💡 **Industry-Academia Collaboration for Skill Development:** Establishing deeper, more **structured partnerships between higher education institutions and industries is crucial for bridging the skill gap.**
  - ✦ Universities should integrate hands-on industry internships, apprenticeships, and live project work into curricula.
  - ✦ Creating **dedicated innovation hubs or "industry-collaboration cells"** within campuses would ensure that students are trained with relevant, real-world skills.
    - 💡 Regular consultations with industry experts can help align course content with evolving market needs, making graduates more employable.

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💡 **Revamping the Curriculum to Foster Critical Thinking:** Higher education curricula need a fundamental shift toward **fostering critical thinking, problem-solving, and interdisciplinary learning.**

- ✦ The rigid, discipline-specific approach should be replaced with **flexibility, allowing students to choose courses from various fields, blending humanities, sciences, and technical disciplines as envisioned by NEP 2020.**
- ✦ By encouraging collaborative learning across disciplines, students can approach problems holistically and gain skills that are adaptable across industries and sectors.

💡 **Promoting Research-Driven Education and Funding:** The government must increase investments in research and development within universities and offer grants that **incentivize faculty and students to engage in innovative and impactful research.**

- ✦ Establishing more university-industry partnerships for joint research projects can address national and global challenges, enhancing the relevance of research outputs.
- ✦ Additionally, **creating a clear pathway for commercialization of research, such as setting up research parks and incubators,** will allow for greater innovation and knowledge transfer to industries.

💡 **Enhancing Digital Infrastructure and Hybrid Learning Models:** To meet the demands of the digital age, universities should invest in state-of-the-art digital infrastructure that supports online learning, research, and collaboration.

- ✦ A **hybrid learning model, combining traditional face-to-face education with online resources,** should be the norm, allowing students from diverse backgrounds, including remote areas, to access high-quality education.
- ✦ **Investments in digital literacy for both students and faculty** are essential to ensure that technology integration is effective and inclusive.

💡 **Incentivizing Global Collaborations and Internationalization:** India must actively foster international collaborations with top global universities, allowing for dual-degree programs, faculty exchange initiatives, and research partnerships.

- ✦ Incentivizing **foreign faculty and researchers to engage with Indian institutions** will enhance academic rigor and internationalize the curriculum.
- ✦ This international exposure will not only enhance the academic reputation of Indian universities but also help students gain a global perspective, improving their employability and competitiveness.

💡 **Enhancing Inclusivity and Equity in Access to Education:** To ensure that higher education becomes truly inclusive, India must adopt a comprehensive approach to support students from **marginalized communities, women, and differently-abled individuals.**

- ✦ This includes scholarship schemes, mentorship programs, and better infrastructure to accommodate students with disabilities.
- ✦ Universities should also focus on increasing the representation of underprivileged groups in **STEM fields by offering targeted support systems,** ensuring equitable access to quality education for all socio-economic backgrounds.

💡 **Fostering Entrepreneurial Mindsets and Startup Ecosystem:** Creating an ecosystem that encourages entrepreneurship within **higher education institutions can help students translate their ideas into startups.**

- ✦ **Universities should establish incubation centers,** offer seed funding, and provide mentorship programs to foster a culture of innovation and entrepreneurship.
  - 📌 Students must be made aware of the initiatives like **Jagriti Yatra.**
- ✦ By integrating entrepreneurship as part of the curriculum, along with dedicated resources for business development, institutions can produce graduates who are not just job seekers but job creators, contributing to the economy in a more substantial way.

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💡 **Expanding Financial Support and Affordable Education Models:** Addressing the high cost of higher education is crucial for ensuring access for all segments of society.

- ✦ The government and private sector should collaborate to create financial aid systems, such as **income-based loan repayment schemes**.
- ✦ In addition, **universities should explore innovative models like “study now, pay later” schemes**, making quality education more affordable and accessible to all.

### Conclusion:

To truly transform India's higher education landscape, reforms must go beyond expansion and focus on quality, inclusivity, and relevance. As the *Kothari Commission* rightly emphasized, **education must be “a powerful instrument of social, economic, and cultural transformation.”** Reviving this vision through skilled faculty, research excellence, industry linkages, and ethical governance will ensure that higher education becomes a driver of national progress and global competitiveness.

## Balancing Growth and Rivalry With China

*This editorial is based on “[Jaishankar in China: A cooperative Beijing is desirable, but a less uncooperative one is India's best bet](#)” which was published in The Indian Express on 17/07/2025. The article brings into picture the cautious*

*renewal of India-China ties post-Galwan through EAM Jaishankar's visit, highlighting progress on trade but lingering border tensions.*

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

India's External Affairs Minister S. Jaishankar's first visit to China since the **2020 Galwan standoff** signals both nations' efforts to rebuild diplomatic ties on new foundations. While immediate trade issues like **rare earth minerals export restrictions** can be addressed quickly, the fundamental border question remains unresolved and sidelined. India faces the challenge of engaging a **militarily superior neighbor while strengthening itself internally and preserving core interests**. The emerging framework aims to ensure that **“differences should not become disputes, nor should competition ever become conflict.”**



### What is the Strategic Importance of India-China Cooperation in Advancing India's Development Trajectory?

- 💡 **Economic Growth and Trade Linkages:** **India-China cooperation** is crucial for India's economic growth, as China remains one of its largest trading partners.
- ✦ Despite political tensions, **bilateral trade between the two countries reached \$118.4 billion in 2023-24**, making China India's largest trading partner ahead of the US.
- ✦ This trade includes critical imports like **telecom parts, pharmaceutical ingredients, and advanced technology components**, essential for India's manufacturing and digital sectors.

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💡 **Technology Transfer and Manufacturing:** China's technological dominance, particularly in manufacturing, can significantly boost India's industrial base.

✦ India's **"Make in India"** initiative seeks to enhance domestic manufacturing, but China's advanced supply chain and manufacturing capabilities are indispensable for accelerating this goal.

✦ In 2023, India launched **PLI schemes** for sectors like electronics, but despite these efforts, the slow pace of growth in domestic manufacturing points to the crucial need for Chinese investment and expertise in key areas such as **semiconductor production and electronics**.

✦ China has invested in **18 of India's leading 30 enterprises** and start-ups (entrepreneurial initiatives valued at more than \$1 billion).

📎 The total value of Chinese investments in Indian startups between **2015 to 2020** is approximately **USD 4 billion**.

💡 **Infrastructure and Connectivity Enhancement:** The need for infrastructural development in India calls for closer cooperation with China, particularly in **railways, roads, and urban development**.

✦ Currently, India is its largest borrower in China-led **Asian Infrastructure Investment Bank** and second-largest shareholder, owning around 7.5% voting power.

📎 Out of 202 projects approved by the AIIB between 2016 to 2022, India hosts the most (39).

✦ Chinese cooperation on projects like the **trans-border Kailash Mansarovar pilgrimage** shows that both sides can collaborate on regional connectivity.

💡 **Environmental and Climate Cooperation:** India and China can drive meaningful collaboration on **climate change and environmental issues**, vital for both countries' sustainable development.

✦ In recent years, both nations have recognized the urgency of addressing global environmental concerns, with China leading in renewable

energy investments and India advancing its clean energy targets.

✦ China's leadership in **solar energy** technology is crucial for India, which is aiming to meet ambitious renewable energy goals of **500 GW by 2030**.

📎 China's massive investment in green technology could support India's transition, especially in sectors like electric vehicles and solar power infrastructure.

💡 **Strategic Economic Decoupling and Supply Chain Resilience:** The geopolitical tensions surrounding global trade and technology supply chains have underscored the **importance of India-China cooperation in ensuring economic resilience**.

✦ Both India and China are integral to the global supply chain, particularly in sectors like **technology, pharmaceuticals, and rare earth minerals**.

✦ As the world moves towards a potential decoupling of global supply chains due to geopolitical factors—such as the **US-China rivalry**—India's cooperation with China can play a critical role in mitigating the risks associated with over-dependence on any single nation.

📎 By leveraging China's advanced manufacturing ecosystem and technological expertise, **India can diversify its own supply chains, ensuring access to critical components, such as semiconductors and electronics**, without falling into the trap of excessive reliance on Western nations.

💡 **Energy Security and Regional Resource Management:** The energy security landscape in Asia, particularly with respect to **oil, natural gas, and renewable energy**, is increasingly shaped by the complex interdependencies between India and China.

✦ Both countries are **major consumers of energy resources**, yet they also face challenges in securing stable energy supplies amidst fluctuating global prices and shifting geopolitical power dynamics.

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- ✦ India and China could cooperate to ensure long-term energy security in the region through collaborative projects in areas like **cross-border energy grids, resource exploration in the Indian Ocean**, and even joint investments in alternative energy sources such as nuclear, solar, and wind.

💡 **Geostrategic Influence and Multilateral Engagement:** India-China cooperation holds significant geostrategic importance for both countries, particularly in the context of shifting global power dynamics.

- ✦ As two major Asian powers, **their relationship will play a pivotal role in shaping the future of the Indo-Pacific region.**
- ✦ Collaborative engagement between India and China can provide both nations with enhanced leverage in multilateral institutions like the **G20, BRICS, and the Shanghai Cooperation Organization (SCO).**

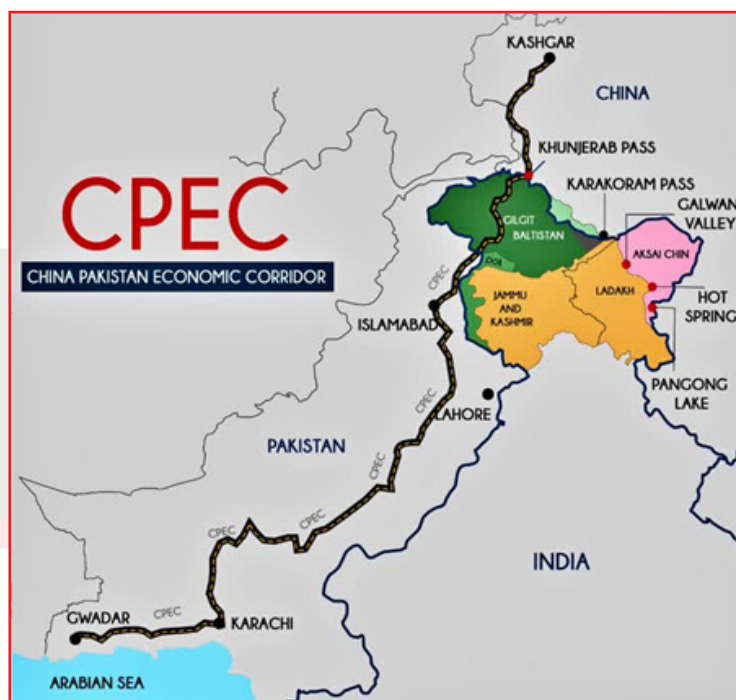
### What are the Key Issues Hindering Effective India-China Dialogue?

- 💡 **Border Disputes and Militarization:** The unresolved border issue remains the most significant barrier to effective dialogue between India and China.
  - ✦ Despite multiple rounds of disengagement talks, tensions persist along the **Line of Actual Control (LAC)**, especially in areas like **Eastern Ladakh and Arunachal Pradesh.**
  - ✦ The **Xiaokang** or “well-off villages” are part of China’s strategic border infrastructure push to strengthen its frontier presence. And India is also investing heavily in infrastructure development, such as **roads and surveillance systems**, to counter China’s stronger military presence.

- ✍ The absence of a **lasting resolution** creates a fundamental impasse in bilateral relations.

💡 **China’s Strategic Partnerships with Pakistan:** China’s deepening relationship with Pakistan complicates its ties with India, particularly in terms of security and regional influence.

- ✦ The **China-Pakistan Economic Corridor (CPEC)** and military cooperation between Beijing and Islamabad have been viewed as a direct challenge to India’s strategic interests.



- ✦ In May 2025, **China backed Pakistan’s stance during the Pahalgam terror attack**, signaling its alignment with Pakistan over India’s security concerns.
  - ✍ Pakistan being heavily dependent on Chinese military and economic aid, **India sees this as an obstacle to normalizing relations**, especially as China shields Pakistan-backed terrorists in international forums like the **UN.**
- 💡 **Trade Imbalance and Economic Dependency:** The growing trade deficit between India and China is a critical issue hindering constructive dialogue.
  - ✦ **In FY2023-24, India’s imports from China totaled \$101.7 billion**, far exceeding its exports of \$16.67 billion, creating a **\$99.2 billion trade deficit.**

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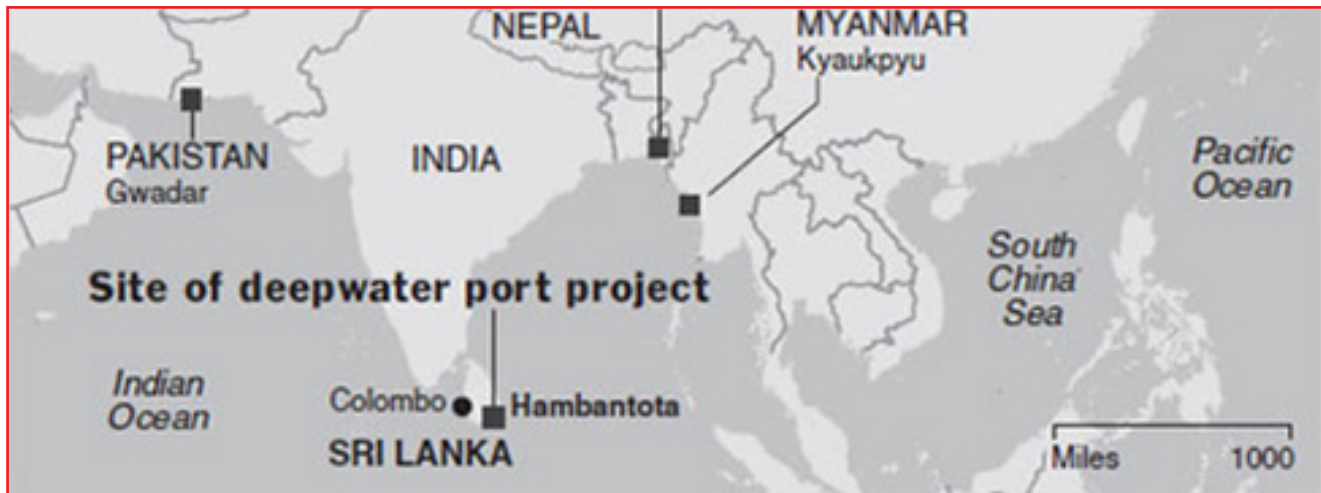


- ✦ Despite efforts to reduce dependence through initiatives like “Make in India,” **India remains reliant on China for vital imports such as electronics, active pharmaceuticals, and telecom components.**

✎ This economic imbalance **limits India’s bargaining power and fosters dissatisfaction**, particularly as India looks to reduce its vulnerability to Chinese economic leverage.

- 💡 **China’s Expansionist Policies and Regional Influence:** China’s assertive policies in the Indian Ocean and its Belt and Road Initiative (BRI) further complicate India-China relations.

- ✦ India’s concerns about China’s increasing military and economic presence in South Asia, especially in Sri Lanka, Nepal, and the Maldives, highlight the growing strategic competition.
- ✦ China’s control over key ports in **Pakistan (Gwadar), Sri Lanka (Hambantota), and Myanmar (Kyaukpyu)** creates an encirclement scenario for India.



✎ This regional power struggle underscores the broader geopolitical rivalry, with China seeking to expand its influence, often at the expense of India’s strategic interests.

- ✦ China’s proposed hydropower project on the **Yarlung Tsangpo poses a ‘water bomb’ threat to India**, sparking concerns and calls for action.

- 💡 **China’s Aggressive Stance in Multilateral Forums:** China’s growing influence in multilateral forums, often at odds with India’s interests, exacerbates tensions between the two nations.

- ✦ **China has blocked India’s efforts to gain a permanent seat on the UN Security Council**, despite broad international support for India’s bid.
- ✦ Moreover, **China’s veto power has been used to shield Pakistan in the United Nations**, particularly on issues related to terrorism.

✎ These actions contribute to the perception in India that **China is undermining its global aspirations**, thereby making effective dialogue difficult as both countries compete for regional and global influence.

- 💡 **Inconsistent Diplomatic Approaches and Mistrust:** A fundamental issue between India and China is the lack of consistent diplomatic engagement and the **growing mistrust stemming from frequent shifts in both countries’ approaches.**

- ✦ While **India calls for a resolution based on peace and respect for the LAC**, China often downplays the border issue and focuses on trade and economic cooperation.
- ✎ **China has ongoing border disputes with several neighboring countries, and even tensions with nations it doesn’t directly border**, creating strategic uncertainty for India.

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- ✦ The continued divergence in their approach to core issues fosters **skepticism** and undermines meaningful cooperation.

### What Measures can India Adopt to Extend Cooperation with China?

- 💡 **Focused Dialogue on Border Management and Confidence-Building:** India should intensify its diplomatic engagements with China through dedicated, consistent talks on border management.
  - ✦ By expanding the existing mechanisms like the “Corps Commander-level talks” and “Working Mechanism for Consultation and Coordination” (WMCC), India can ensure that peace and tranquility are maintained along the Line of Actual Control (LAC).
  - ✦ This would include creating more **no-patrol zones, establishing crisis management protocols, and setting up real-time communication channels** between the military establishments to avoid misunderstandings or escalations.
- 💡 **Economic Engagement through Trade Diversification:** India should push for a more balanced trade relationship with China by negotiating bilateral trade frameworks that focus on diversifying exports beyond raw materials, promoting technology and high-value sectors.
  - ✦ Furthermore, **India can strategically utilize China’s technological expertise to build domestic capabilities** in high-tech industries such as **5G and artificial intelligence** without compromising on security.
- 💡 **Strengthening People-to-People Ties and Cultural Diplomacy:** Cultural and people-to-people exchanges play a crucial role in fostering long-term bilateral relations.
  - ✦ **India should ramp up diplomatic and academic collaborations** with China, focusing on collaborative research, educational exchange programs, and cultural initiatives.
  - ✦ A stronger emphasis on **soft diplomacy**, such as academic institutions engaging in joint projects, arts festivals, and tourism initiatives,

could alleviate mistrust and build mutual understanding.

- 💡 **Joint Initiatives for Regional Development and Connectivity:** India should explore regional cooperation initiatives with China that focus on infrastructure development and connectivity, especially in South Asia.
  - ✦ By participating in **mutually beneficial projects like cross-border transport corridors, energy grids, and clean energy partnerships**, India can leverage China’s expertise and funding while maintaining strategic autonomy.
- 💡 **Technology and Innovation Partnerships with Strategic Safeguards:** India should engage China in **joint research and development (R&D) ventures** in emerging technologies such as **quantum computing, renewable energy, and biotechnology**, while ensuring robust safeguards to protect sensitive technologies.
  - ✦ Establishing collaborative frameworks for innovation, with **transparency and intellectual property protections**, would enable India to benefit from China’s technological advancements without compromising national security.
- 💡 **Environmental Collaboration and Joint Green Initiatives:** India can extend cooperation with China by joining forces on global environmental initiatives, particularly in **combating climate change and transitioning to renewable energy**.
  - ✦ Initiating joint projects on carbon reduction technologies, electric vehicles, and solar energy development could position both countries as leaders in sustainable development. By aligning their efforts on green technology, India and China can strengthen bilateral ties, share best practices, and influence global environmental policies, all while safeguarding national interests in the process.
- 💡 **Digital Diplomacy and Cybersecurity Cooperation:** Given the growing importance of digital infrastructure and cybersecurity, India should **initiate cooperative frameworks with China focused on building secure digital economies**.

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- ✦ By creating bilateral cybersecurity dialogue platforms, both countries can address issues like **data privacy, cybercrime, and the protection of critical infrastructure.**
- ✦ At the same time, India must remain vigilant in safeguarding its digital sovereignty, ensuring that any cooperation in cyberspace adheres to national security protocols.

### Conclusion:

India-China relations are shaped by the delicate balance of the **four C's** — **conflict, competition, cooperation, and containment.** As EAM Jaishankar aptly stated, *"Stable and constructive ties between India and China are not only to our benefit, but that of the world as well."* By navigating their complex relationship with a focus on cooperation, both nations can leverage their strengths to **foster economic growth, regional security, and sustainable development,** contributing to a more balanced and multipolar world order.

## AI for India'S Economic Transformation

*This editorial is based on "How India can protect jobs amidst the rapid AI march" which was published in Hindustan Times on 15/07/2025. The article highlights that India must urgently launch a national AI-readiness mission to transform jobs, education, and institutions for an AI-driven future.*

**Tag:** GS Paper - 3, Robotics, Artificial Intelligence, Scientific Innovations & Discoveries, IT & Computers, GS Paper - 2, Government Policies & Interventions

**Artificial Intelligence (AI)** is emerging as a core enabler of India's economic and developmental ambitions. With the domestic AI market projected to reach **\$17 billion by 2027**, and **over 600,000 AI professionals** currently employed, India holds **16% of global AI talent.** Its application spans **agriculture, logistics, MSMEs, healthcare, and energy.** Leveraging platforms like **Aadhaar, Open Network for Digital Commerce (ONDC), and UPI,** India is poised to integrate AI for inclusive

transformation. However, to realise this potential, a calibrated approach addressing **infrastructure, skilling, governance, and equity** is essential.

### How can AI Drive Inclusive Growth and Economic Transformation in India?

#### 💡 Economic and Employment Impact:

- ✦ **Massive Economic Potential:** India's AI market is expected to triple to **\$17 billion by 2027**, growing annually at 25-35%.
  - 📌 This growth reflects India's **youthful workforce**, digital access, and enterprise readiness for **Generative AI** integration.
- ✦ **Boost to Employment and Productivity:** AI is projected to create **1.25 million domestic jobs by 2027**, according to Deloitte and Nasscom.
  - 📌 Generative AI enhances productivity by **66% in task performance**, according to a recent research.
- ✦ **Global Competence in Talent:** India accounts for **16% of global AI talent**, second only to the United States in volume.
  - 📌 More than **600,000 AI professionals** currently work in India, expected to double by 2027.

#### 💡 Sectoral AI Adoption:

- ✦ AI is transforming **agriculture, logistics, healthcare, and retail** by optimising operations and decision-making.
- ✦ According to the **National Council of Applied Economic Research**, logistics costs accounted for **7.8-8.9% of GDP** in 2021-22, and with the strategic integration of AI, the sector could uncover valuable patterns, predict disruptions, and create innovative solutions.
- ✦ **PandoAI**, for instance, uses AI to reduce **logistics inefficiencies** and improve real-time supply chain performance.

#### 💡 Boosting Agricultural Productivity:

- ✦ **Empowering Agricultural Workforce:** Over **46.1% of India's workforce** is in agriculture, often suffering from low productivity and climate stress.

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✍ ITC's **MAARS platform** provides personalised crop advisories, input planning, and market access to over 2 million farmers.

#### 💡 AI in Biosciences and Energy:

✦ **Driving Growth in Biomanufacturing:** AI is catalysing India's **biomanufacturing** and **biosciences sector** through predictive modelling and bioprocess optimisation.

✍ Under the **BioE3 policy**, AI supports high-value domains like **biosynthetics, vaccine design**, and precision fermentation.

✦ **Energy and Sustainability Contribution:** AI enables **predictive grid management, renewable forecasting**, and efficient energy use across sectors.

✍ Such integration supports India's **net-zero 2070 target** and energy resilience goals.

#### 💡 AI in Public Service Delivery:

✦ **Transformation of Education:** AI integration can address India's **1.5 million annual engineering graduates**, many of whom face underemployment.

✍ Skill initiatives must embed **AI fluency, problem-solving, and adaptability** into mainstream curricula.

✦ **Strengthening Public Infrastructure:** India's digital infrastructure, including the **Aadhaar system, UPI, and ONDC**, facilitates scalable and inclusive AI interventions.

✍ With over **700 million internet users**, data volume and access offer a foundation for broad-based transformation.

✍ For instance, the **RBI's MuleHunter AI** uses advanced machine learning algorithms to detect and prevent fraudulent financial activities, such as money laundering and illegal fund transfers.

### What are the Key Challenges in India's AI Progress?

💡 **Vulnerable Low-Skilled Workforce:** AI threatens **low-value service roles** like data entry and customer support, many held by informal workers.

✦ These segments include **women and rural populations**, widening the inequality risk without targeted upskilling.

💡 **Digital Infrastructure Gaps:** Rural areas still face **limited internet access and device penetration**, curbing AI's inclusive potential.

✦ About **65% of India's population** lives in rural regions, where **digital readiness** remains low.

💡 **Compute and Data Limitations:** India generates **20% of global data** but has only **2% of data centres** and compute infrastructure.

✦ High hardware costs and chip dependencies restrict **AI research, modelling, and innovation**.

💡 **Weak Institutional Framework:** India lacks an intersectoral **national AI strategy**, unlike other leading economies like the US, China, the UK and the EU.

✦ The **IndiaAI Mission** lacks the **mandate and coordination authority** needed for cross-sectoral alignment.

💡 **Gender Gaps and Informality:** Women comprise **35% of India's workforce**, largely in roles vulnerable to automation.

✦ Without targeted re-skilling, AI could deepen **labour market exclusion for women**.

💡 **Environmental Footprint:** **Large Language Models (LLMs)** require **high energy use**, straining green transition goals.

✦ According to Goldman Sachs, AI could become a **bottleneck for sustainable energy targets**.

💡 **Research and Academic Lag:** India's universities are **underrepresented in global AI rankings**, and PhD output remains low.

✦ Academia-industry collaboration is weak, limiting **indigenous innovation and foundational AI R&D**.

### What Strategic Measures has India Undertaken to Harness AI for Development?

💡 **IndiaAI Mission:** India has made steady progress in AI with initiatives like **IndiaAI Mission**(with a budget of ₹10,372 crore),

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✦ Its components are part of a broader, democratised approach through “AI for All” with supportive policies.

💡 **FutureSkills PRIME Initiative:** This joint initiative trains youth in **AI, data science, and emerging tech**, ensuring job readiness.

✦ It targets **reskilling and upskilling** across engineering colleges, ITIs, and industry clusters.

💡 **National Semiconductor Mission:** With over **\$10 billion in PLI incentives**, it aims to build **domestic chip manufacturing and design capacity**.

✦ This supports AI hardware self-reliance and reduces exposure to global semiconductor supply risks.

💡 **IndiaAI Compute Push:** The central government plans to procure **10,000 graphics processing units (GPUs)** to bolster India’s AI infrastructure.

✦ Compute capacity expansion is essential to support **GenAI modelling and large-scale deployment**.

✦ Also, **India’s National Semiconductor Mission** seeks to establish a homegrown chip industry, backed by more than \$10 billion in production-linked incentives.

💡 **AI Opportunity Fund:** Launched in 2024, it supports **500,000 workers** in partnership with NGOs and education providers.

✦ It provides access to AI skilling for **underserved communities including women and informal workers**.

💡 **AI for MSMEs:** Policies promote AI access for **90% of India’s business base**, the MSME sector.

✦ Platforms like **Dx-EDGE** are empowering MSMEs with AI tools tailored to their unique needs. Launched by the CII, **NITI Aayog**, and AICTE, Dx-EDGE serves as a national initiative to facilitate digital transformation for MSMEs.

✦ Public and private efforts help MSMEs adopt **AI for inventory, customer management, and operations**.

💡 **Grow with Google Programmes:** Trained over **60 million people across Asia Pacific**, with India as a major beneficiary.

✦ These training modules focus on **digital literacy, AI basics, and contextual application**.

💡 **Sarvam AI and Krutrim Initiatives:** Startups are creating **India-centric LLMs** like **Sarvam-M** and **Krutrim’s** multilingual conversational tools.

✦ These platforms drive **linguistic inclusion** and reduce reliance on foreign models.

💡 **BioE3 and Healthcare Applications:** India’s BioE3 Policy and AI-integrated healthcare platforms aims to boost **biomanufacturing and personalised medicine**.

✦ The BioE3 policy also emphasizes the establishment of **Bio-AI Hubs** to drive innovation and collaboration in the fields of biotechnology and artificial intelligence.

✦ Firms like Biocon and Strand Life Sciences are leading with **predictive drug screening** using AI.

💡 **Smart Energy Integration:** AI enables **smart grid, fault detection, and demand response** in energy systems.

✦ Supports India’s goal of **500 GW non-fossil capacity by 2030** under Paris Agreement commitments.

💡 **Other IndiaAI Initiatives:**

✦ **IndiaAI Innovation Centre:** A hub for fostering collaboration and innovation in AI technologies by bringing together academia, industry, and government.

✦ **IndiaAI Datasets Platform:** A centralized repository of high-quality, publicly available datasets to support AI research and development in India.

✦ **IndiaAI Applications Development Initiative:** An initiative to develop and deploy AI-driven applications across sectors like healthcare, agriculture, and education for societal impact.

💡 **Geopolitical and Governance Leverage:** India leads in the **Global Partnership on AI (GPAI)**, promoting inclusive and ethical AI governance.

✦ **India’s G20 presidency** elevated AI as a global development and strategic agenda.

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## What Policy and Institutional Reforms are Needed to Build an Inclusive AI Future?

- 💡 **Build Stewarding Institutions:** Establish cross-sectoral “stewarding institutions” to align AI development with public welfare.
  - ✦ Form a permanent **Inter-Ministerial AI Coordination Committee** to harmonize AI policy and regulatory efforts across government entities, avoiding fragmentation and ensuring a unified national strategy.
  - ✦ These bodies should anticipate **risks, opportunities, and labour transitions** in real time.
- 💡 **Bridge Skilling and Education Gaps:** Integrate AI skills across **ITIs, polytechnics, and Tier-2/3 colleges**, not only elite institutes.
  - ✦ Develop contextual, **multilingual, gender-sensitive skilling platforms** with real-world application focus.
- 💡 **Incentivise Industry-Academia Collaboration:** Encourage deep-tech R&D via **fellowships, co-labs, and IP-sharing models**.
  - ✦ Align academic curricula with **AI readiness and evolving industry demands**.
- 💡 **Ensure Equitable Infrastructure:** Expand compute and data infrastructure to **Tier-2 and rural India**, ensuring inclusion.
  - ✦ Boost public and private investment in **data centres, connectivity, and edge AI deployment**.
- 💡 **Prioritise Ethics and Accountability:** Design a framework for **explainable, fair, and responsible AI**, especially in sensitive domains.
  - ✦ Incorporate transparency, **data governance, and algorithm audits** into regulatory norms.
- 💡 **Foster Global and Local Partnerships:** Pursue **multilateral cooperation** and local entrepreneurship for AI standard-setting and localisation.
  - ✦ Support startups solving **India-specific challenges** in agriculture, healthcare, and governance.
- 💡 **Prepare for Labour Market Transition:** Forecast job transitions and reskill workers vulnerable to **AI-driven automation**.

- ✦ Create flexible labour pathways into **medium- and high-skill AI-augmented roles**.
- 💡 **Embed AI in Governance and Planning:** Use AI for **policy simulation, targeting efficiency, and climate resilience planning**.
  - ✦ Make AI a tool for inclusive governance, especially in **urban planning and welfare delivery**.

## Conclusion

AI can transform India's economy by **enhancing productivity, creating jobs, and improving service delivery**. With the right **institutional frameworks, equitable access, and multi-sectoral readiness**, India can harness AI not just for growth but for inclusive and sustainable development, becoming a global leader in ethical and human-centric AI innovation.

## Shaping India's Nutrition Revolution

*This editorial is based on “**To improve both crop and human nutrition, India needs a paradigm shift**” which was published in The Indian Express on 07/05/2024. The article brings into picture the paradox of India's food security—while the nation has become the world's largest rice exporter and runs the largest food distribution programme, deteriorating soil health and nutrient imbalance threaten both crop productivity and human nutrition.*

**Tag:** GS Paper - 2, Issues Relating to Poverty & Hunger, GS Paper - 3, Agricultural Resources

India has made a historic leap from **food scarcity** in the 1960s to becoming the world's **largest rice exporter and running the largest public food distribution programme**. Yet, this achievement masks a deeper crisis—**widespread malnutrition** persists. The core of this paradox lies in India's neglected soil health, marked by severe nutrient deficiencies and imbalanced fertilizer use. Poor-quality soils yield calorie-rich but nutrient-poor crops, silently fueling hidden hunger. Ensuring nutritional security now demands a shift from **quantity-focused agriculture to quality-centered food systems**.

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## What are the Key Strides of India in Ensuring Nutritional Security?

- 💡 **Expansion of Universal Food Access through PMGKAY and NFSA:** India has institutionalised food security through legally backed entitlements and free food provisioning for the poor.
  - ✦ By extending **Pradhan Mantri Garib Kalyan Anna Yojana (PM-GKAY)** for five more years from 2024 and **reinforcing NFSA coverage, food availability for over 800 million people is ensured.**
  - ✦ This guarantees caloric security and protects vulnerable populations from inflationary shocks.
    - 📌 **PMGKAY now covers 81.35 crore beneficiaries** with 5 kg rice/wheat/month.
  - ✦ As of July 2024, the **Central Pool holds 608.75 lakh metric tonnes of foodgrains**, significantly surpassing the stocking norm of 411.20 lakh metric tonnes.
- 💡 **Targeted Maternal and Child Nutrition through ICDS and POSHAN Abhiyaan:** Through ICDS and POSHAN Abhiyaan, India has built the world's largest community-based nutrition delivery system.
  - ✦ **Anganwadi Centres now serve as hubs for early childhood nutrition**, maternal care, and growth monitoring. The convergence model improves service outreach and impact.
  - ✦ 100+ crore awareness activities under **POSHAN Abhiyaan** were observed during Poshan Maah in 2024.
    - 📌 **POSHAN Tracker digitised 13.9 lakh Anganwadi centres** for real-time service delivery.
- 💡 **Policy Push for Millets and Crop Diversification:** With the **International Year of Millets 2023**, India has repositioned millets as "nutri-cereals" to enhance dietary diversity and climate resilience.
  - ✦ The inclusion of millets in government procurement and schemes expands access to **protein, fibre-, and mineral-rich food**. This supports both health and farmer income.

- ✦ **Millets included NFSA, ICDS, and school feeding programmes** in select states. **Budget 2023 announced the "Shree Anna" campaign and millet-focused research support.**

- 💡 **Price Stabilisation for Affordable Nutrition:** To ensure affordability of nutritious staples, India has actively used price management tools and launched subsidised retail schemes.
  - ✦ This shields the poor from food inflation and supports dietary adequacy. Public procurement and buffer stock mechanisms have been leveraged smartly.
  - ✦ **Bharat Dal, Bharat Atta, Bharat Rice** retail at subsidised rates via NAFED, NCCF outlets.
- 💡 **Global Leadership in Food System Transformation:** India has emerged as a global player in **food security, contributing to nutrition goals beyond its borders.**
  - ✦ As a food surplus country, its policy and implementation experience is shaping South-South cooperation in nutrition. This marks a reversal from past dependency.
  - ✦ India is the largest rice exporter (20.2 MT in FY25) and second-largest food grain producer.
  - ✦ From PL-480 dependency (**US Public Law 480 (PL-480) program for food aid, primarily wheat**) in the 1960s to current self-sufficiency and export leadership.



## What are the Key Issues Hindering Nutritional Security in India?

- 💡 **Persistent Child Malnutrition Despite Food Surplus:** India has transitioned from **food scarcity to surplus**, yet child malnutrition remains alarmingly high due to a focus on calorie distribution over nutritional quality.
  - ✦ NFHS-5 shows **35.5% children under 5 are stunted**, 19.3% wasted and 32.1% underweight.

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✦ India had by far the largest number of zero-food children (**6.7 million**), which is **almost half of all zero-food children in the 92 countries**.

💡 **Micronutrient Deficiencies Linked to Soil Health Crisis:** Soil degradation and nutrient imbalance directly affect the nutritional value of food, reducing key micronutrients like zinc and iron in crops.

✦ This leads to **“hidden hunger”** where food is **available but lacks essential nutrients**. Current fertiliser use patterns exacerbate the issue.

✦ Of more than 8.8 million samples tested under the **Soil Health Card Scheme** in 2024, less than **5% of Indian soils have high or sufficient nitrogen**.

📌 Zinc-deficient soils correlate with stunting in children—a public health link now recognised.

💡 **Over-Reliance on Cereal-Centric Food Policies:** India’s food security strategy is cereal-heavy, focused on rice and wheat, **neglecting pulses, vegetables, and millets critical for nutrition**.

✦ This leads to dietary monotony and insufficient intake of proteins, vitamins, and minerals. Even flagship schemes reinforce this cereal bias.

✦ PMGKAY covers **81.35 crore people with 5 kg rice/wheat per month** — but lacks diet diversity.

📌 Though **406 LMT of fortified rice has been distributed since 2019** — a step forward, protein intake gaps persist.

💡 **Gendered Dimensions of Malnutrition:** Nutritional inequality is deeply rooted in gender norms, with women and girls often eating last and least.

✦ **Anaemia, poor maternal nutrition, and inadequate prenatal care** perpetuate intergenerational malnutrition. Empowerment is key but under-addressed in food policies.

✦ Recent government data state that **around 57% of women (15–49) are anaemic**. **NFHS-5** recorded **24% adult women to be overweight or obese**

📌 Children born to undernourished women are more likely to be low birthweight and stunted.

💡 **Urban-Rural and Socioeconomic Inequities in Nutrition Access:** Rural, tribal, and low-income households suffer disproportionately from malnutrition due to poor access to health and nutrition services.

✦ Urban areas now face **rising obesity and NCDs** — indicating a **“double burden”** of malnutrition. Public health efforts are unevenly distributed

✦ Stunting is higher among children in **rural areas (37%) than urban areas (30%) (NFHS-5)**.

💡 **Inadequate Reach and Quality of Health & Nutrition Infrastructure:** Despite schemes like ICDS and Poshan Abhiyaan, delivery remains patchy due to infrastructure gaps, staffing issues, and poor convergence.

✦ **Ayushman Arogya Mandirs** are underutilised for nutrition services. Monitoring and targeting remain weak.

✦ Only **66% of POSHAN Abhiyaan funds spent as of 2022**; HWC coverage uneven across regions. (ORF India)

💡 **Sanitation, Hygiene and Environmental Health Linkages:** Poor WASH (Water, Sanitation, Hygiene) practices increase disease burden, reducing nutrient absorption and exacerbating undernutrition.

✦ Environmental factors like contaminated water, open defecation, and pollution remain serious barriers to nutrition.

✦ 50% of malnutrition is linked to repeated diarrhoea from poor hygiene (WHO).

📌 India still has ~620 million people practicing open defecation in some areas (UNICEF, 2021).

💡 **Price Volatility and Affordability of Nutritious Food:** Inflation, supply shocks, and unequal income growth have made nutritious food unaffordable for many.

✦ **FAO Report (2023)** states that **74.1% of Indians are unable to afford a healthy diet**.

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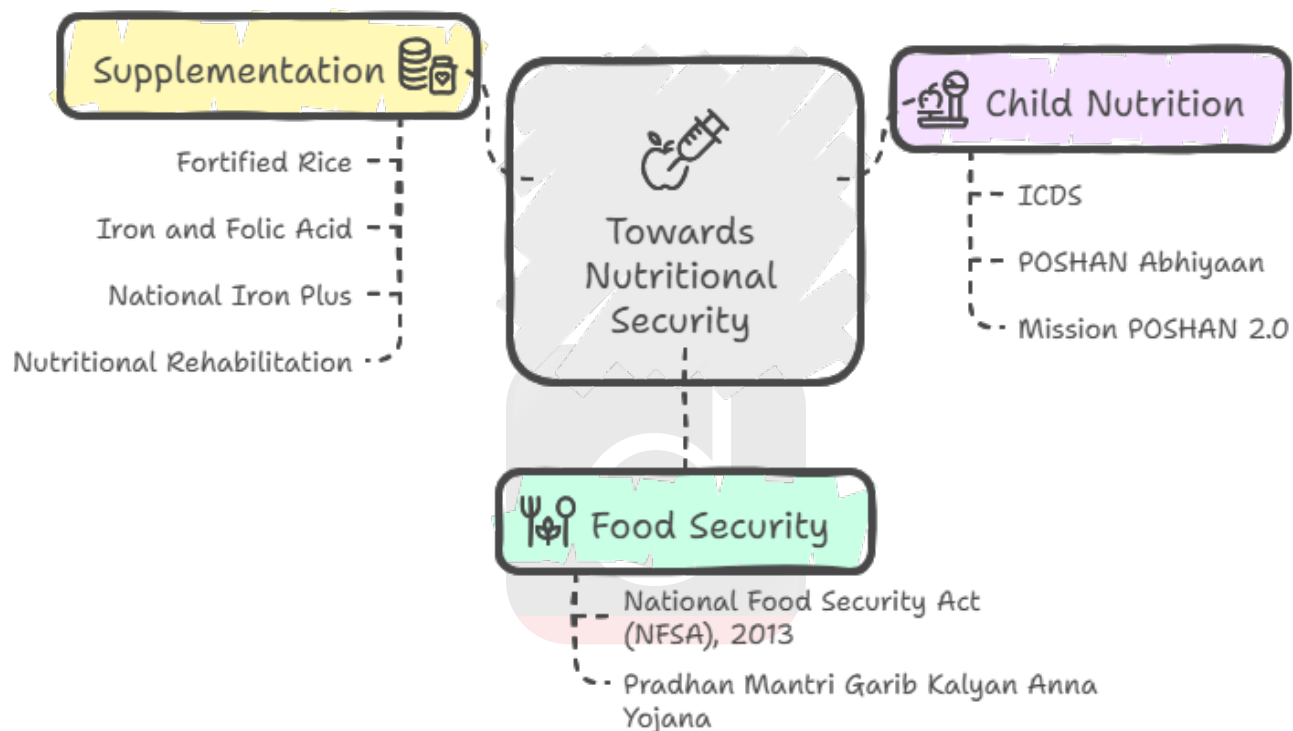


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Even with food grain security, access to fruits, pulses, and animal proteins is limited for poor households. Recent food price spikes worsen the crisis.

## Government Initiatives Related to Nutrition



### What Measures can India Adopt to Enhance Nutritional Security in India?

- Shift from Calorie Security to Nutrient-Dense Food Systems:** India must restructure its food policy architecture to prioritize dietary diversity by integrating pulses, millets, vegetables, and animal proteins into government schemes.
  - ✦ This demands **revisiting Minimum Support Price** and **procurement frameworks** to incentivize nutrient-rich crops. PDS must evolve into a tool for nutritional security, not just caloric sufficiency.
  - ✦ Linking agriculture with health goals ensures sustainable food systems. Such an approach also aligns with **SDG 2.2 targets**.
- Localized Nutrition Planning through District Nutrition Action Plans (DNAPs):** Every district must formulate a **data-driven Nutrition Action Plan** aligned with local food cultures, agro-climatic conditions, and deficiencies.
  - ✦ These plans can be anchored in **Zila Parishads** and **monitored via Nutrition Dashboards**. Institutional convergence through DM-led district nutrition committees will strengthen accountability.
  - ✦ This decentralised strategy ensures context-sensitive interventions. It will also bridge the implementation gap across diverse geographies.

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💡 **Mainstream Soil-Health Linked Nutrition Strategy:**

A national framework linking soil health to human nutrition is needed, with targeted investments in soil organic carbon restoration and micronutrient balancing.

- ✦ **Soil Health Cards must integrate nutrition outcome indicators.** Promoting biofortification and agro-ecological practices can enhance the nutritive value of crops. This aligns agricultural policy with public health objectives.

📌 “From Soil to Stomach” must become a policy mantra.

💡 **Reinforce Frontline Nutrition Delivery through Ayushman Arogya Mandirs:**

Ayushman Arogya Mandirs should be equipped with dedicated nutrition counsellors to deliver personalized dietary advice, growth monitoring, and behaviour change communication.

- ✦ Expanding their role from curative to preventive nutrition services will help mainstream holistic wellness.
- ✦ **HWCs must operate as convergence points for ICDS, WASH, and NCD screening.**

📌 Mobile HWC units can serve remote and urban poor populations. This brings nutrition closer to people's homes.

💡 **Universal Fortification Beyond Staples with Region-Specific Nutrients:**

Food fortification must go beyond iron-folic rice and salt to include milk, edible oils, pulses, and condiments based on regional nutritional gaps.

- ✦ Encouraging decentralized, small-scale fortification through local SHGs and cooperatives can enhance reach and cultural acceptability. Nutrition-sensitive value chains must be supported with fiscal incentives.
- ✦ Fortified food supply should also expand to **anganwadis, schools, and workplace canteens**. This ensures a wider coverage of hidden hunger.

💡 **Revamp Take-Home Ration (THR) into Customised Nutrition Kits:**

THR must be redesigned to meet

age-specific and physiological requirements (children, adolescent girls, pregnant women).

- ✦ Local sourcing of ingredients through **Farmer Producer Organisations (FPOs) and SHGs** can improve freshness and reduce logistics costs. Integration with **Poshan Vatikas and Ayurveda-based nutrition models** adds value.

- ✦ Packaging should include instructions for use and preparation. This brings dignity and efficacy into government nutrition provisioning.

💡 **Make Nutrition a Core Mandate in Education System:**

School curriculums should embed compulsory **nutrition literacy modules from primary levels**, covering **balanced diets, food safety, and locally available healthy foods**.

- ✦ Teachers should be trained in nutrition pedagogy and incentivised for conducting regular health-nutrition sessions.
- ✦ Collaboration with **local cooks and mothers for meal planning adds contextual sensitivity**. Schools should also act as demonstration sites for healthy dietary practices. Early awareness fosters lifelong impact.

💡 **Create a Unified Nutrition Monitoring and Accountability Framework:**

A real-time National Nutrition Grid should be developed by integrating data from **NFHS, POSHAN Tracker, PM-POSHAN, SHC, and HWC portals**.

- ✦ This can track district-wise performance, service delivery, and outcomes simultaneously.
- ✦ Quarterly nutrition audits led by third-party institutions will ensure transparency. Integration with SDG dashboard and GHI score tracking will improve India's global rankings. **Data-driven decision-making becomes the bedrock of national nutrition policy.**

💡 **Integrate Nutrition with Climate-Resilient Food Systems:**

Nutrition security strategies must incorporate climate adaptation by promoting drought-resilient, nutrient-rich crops like millets, pulses, and tubers. Investments in **agroforestry, integrated farming systems, and indigenous crop revival** can diversify nutrition sources.

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- ✦ Policy incentives for low-emission, high-nutrition food chains will serve dual goals.
- ✦ This aligns with **India's commitment under SDG 13 and sustainable food systems under UNFSS**. Nutrition must become climate-smart.

💡 **Expand Private Sector Engagement through Nutrition-CSR Missions:** Corporates should be mandated under CSR norms to invest in nutrition-specific and nutrition-sensitive interventions in their areas of operation.

- ✦ This includes workplace nutrition initiatives, supply chain fortification, mobile clinics, and mother-child support programs.
- ✦ **Public-private partnerships in fortified food production and distribution must be scaled.** Branding nutritional outreach can also reduce stigma. This brings scale, innovation, and sustainability into public nutrition efforts.

💡 **Launch a Gender-Responsive Nutrition Budgeting Framework:** Gender-sensitive budgeting must be applied across ministries (Health, WCD, Agriculture, Panchayati Raj) to ensure resources reach **female-headed households, adolescent girls, and women farmers**.

- ✦ Intersectional mapping of nutritional vulnerability will help target funds better. Conditional cash transfers for diet improvement should be expanded.
- ✦ **Women must also be represented in nutrition governance at local levels.** This ensures equity in access and empowerment.

### Conclusion:

India's progress in food production and distribution is remarkable, yet the battle against hidden hunger is far from over. Bridging the gap between food availability and nutritional adequacy demands a holistic, soil-to-stomach approach. As Mahatma Gandhi said, **"It is health that is real wealth and not pieces of gold and silver."** Ensuring **nutritional security is not just a policy goal—it is a moral imperative for a healthier, equitable future.**

## Soil Health Crisis and India's Path to Recovery

*This editorial is based on "[Healing soils in India](#)" which was published in The Financial Express on 21/07/2025. The article brings into picture the alarming degradation of India's soils, marked by plummeting nutrient levels and fertilizer efficiency. It stresses the urgent need for a shift towards precision, science-based soil management to sustain agriculture.*

**Tag:** GS Paper - 3, Conservation, Irrigation, Sustainable Farming, Environmental Impact Assessment (EIA)

The foundation of India's agriculture is crumbling beneath our feet, as the very soils that enabled the nation's transformation face unprecedented degradation. **Soil Health Card data reveals a stark reality: less than 5% of Indian soils have sufficient nitrogen.** The fertilizer efficiency has crashed from **1:10 in the 1970s to a mere 1:2.7 today**, while excessive nitrogen application pollutes groundwater and releases greenhouse gases 273 times more potent than carbon dioxide. India's agricultural future depends on an urgent **shift from quantity-driven fertilization to science-based, precision soil management** that can restore the health of our most vital resource.

### What are the Key Factors Contributing to Soil Degradation in India?

- 💡 **Overuse and Misuse of Fertilizers:** The rampant and imbalanced use of fertilizers is one of the leading contributors to soil degradation in India.
  - ✦ The over-reliance on **nitrogen-based fertilizers, while neglecting essential nutrients like potassium**, has led to a severe imbalance in soil health.
  - ✦ India's fertilizer usage is heavily skewed, with an **NPK (Nitrogen, Phosphorus, Potassium) ratio of 7.7:3.1:1**, significantly deviating from the recommended **4:2:1 ratio**.
    - 📌 This imbalance is causing nutrient deficiencies, soil fatigue, and ultimately, lower crop yields.

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💡 **Water Erosion and Irrigation Practices:** Excessive irrigation, particularly in regions like **Punjab and Tamil Nadu**, has worsened soil erosion and **salinization**.

- ✦ Poor drainage and overwatering result in **secondary salinization**, making the soil increasingly unfit for agriculture.
- ✦ The **Desertification and Land Degradation Atlas** reveals that **water erosion alone affects 11.01% of India's land**, while regions like Tamil Nadu suffer from water erosion and **localized salinity**, highlighting the urgency of improving irrigation methods.

💡 **Deforestation and Land Conversion:** The ongoing **deforestation for agricultural expansion and urbanization** is **exacerbating soil degradation** by removing the natural vegetative cover, which protects the soil from erosion.

- ✦ **95% of tree cover loss in India between 2013 and 2023 occurred within natural forests**, according to **Global Forest Watch (GFW)**.
  - 📌 This significant loss in natural forest areas is accelerating erosion
- ✦ The biggest hotspot for soil erosion in the country is the **Brahmaputra Valley in Assam**.

💡 **Climate Change and Extreme Weather:** Climate change has intensified the impact of soil degradation by increasing the frequency of extreme weather events such as floods and droughts.

- ✦ **Altered rainfall patterns and higher temperatures** lead to soil erosion and a decrease in organic matter.
- ✦ The Desertification Atlas shows that **83.69 million hectares of dryland are undergoing desertification**, worsened by both climate change and human activities, stressing the need for adaptive soil management practices.

💡 **Intensive Farming and Monocropping:** Intensive farming practices, including monocropping,

contribute to **nutrient depletion and organic matter loss**.

- ✦ Monocropping in states like Punjab, which predominantly grows wheat and rice, depletes specific nutrients from the soil, rendering it less fertile.
- ✦ **Soil Organic Carbon** in many intensively farmed areas has fallen to **0.3%**, from historical levels of around **1%**, reducing fertility.
  - 📌 Physical indicators like **reduced porosity and stability** are routinely reported in **sugarcane and rice monocultures**.
  - 📌 This leads to lower crop yields and increased dependency on chemical inputs.

💡 **Industrial Pollution and Mining:** Industrial zones and mining belts in India are experiencing significant accumulation of toxic heavy metals such as **lead (Pb), chromium (Cr), cadmium (Cd), nickel (Ni), zinc (Zn), and copper (Cu)** in soils.

- ✦ Recent studies from industrial clusters, including **Kanpur (Uttar Pradesh) and Ahmedabad (Gujarat)**, found Pb and Mn levels in soils and vegetables far exceeding permissible limits, presenting direct human health risks through food consumption.
  - 📌 Heavy metal contamination reduces **soil productivity, destroys beneficial microbial communities, and compromises nutrient cycling**.

💡 **Overgrazing and Land Overuse:** India sustains over **535 million livestock**, far **exceeding the land's sustainable carrying capacity** and exerting extreme pressure on grazing lands, particularly in semi-arid and arid regions like **Rajasthan, Gujarat, and Maharashtra**.

- ✦ This loss of cover exposes the **soil to wind and water erosion**, further deteriorating its structure.

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## How does Soil Vulnerability Vary Across Different Regions in India?

| Soil Type          | Predominant Areas                                                            | Associated Issues                                                                                                                                                                                       |
|--------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alluvial Soil      | Gangetic plains, Indo-Gangetic belt, coastal plains of Tamil Nadu and Odisha | <ul style="list-style-type: none"> <li>Nutrient depletion due to intensive cultivation</li> <li>Risk of waterlogging in low-lying areas</li> <li>Susceptible to erosion if left uncultivated</li> </ul> |
| Black Soil (Regur) | Maharashtra, Madhya Pradesh, Gujarat, Andhra Pradesh, Tamil Nadu             | <ul style="list-style-type: none"> <li>High clay content leads to poor drainage</li> <li>Soil cracking in dry conditions</li> <li>Susceptible to salinization with excessive irrigation</li> </ul>      |
| Red Soil           | Southern and Eastern parts (Tamil Nadu, Karnataka, Odisha, Andhra Pradesh)   | <ul style="list-style-type: none"> <li>Low in nitrogen and organic carbon</li> <li>Prone to erosion due to low vegetative cover</li> <li>Low water retention capacity</li> </ul>                        |
| Laterite Soil      | Western Ghats, Assam, Kerala, Odisha, coastal areas of West Bengal           | <ul style="list-style-type: none"> <li>Nutrient-deficient and highly acidic</li> <li>Low moisture retention</li> <li>Prone to erosion during heavy rainfall</li> </ul>                                  |
| Desert Soil        | Rajasthan, Gujarat, Haryana, parts of Punjab and Maharashtra                 | <ul style="list-style-type: none"> <li>High salinity, low fertility</li> <li>Prone to wind erosion</li> <li>Water scarcity and poor nutrient retention</li> </ul>                                       |
| Mountain Soil      | Himalayan region, Northeastern states (Arunachal Pradesh, Nagaland, Sikkim)  | <ul style="list-style-type: none"> <li>Steep slopes leading to soil erosion</li> <li>Low fertility in alpine areas</li> <li>Landslides and water runoff in hilly terrains</li> </ul>                    |

## What are the Key Implications of Soil Degradation?

### 💡 Economic Impacts:

- ✦ **Declining Agricultural Productivity:** Soil degradation directly reduces agricultural productivity, leading to lower crop yields.
  - 📎 The deterioration of soil quality affects vital nutrients, making it harder for crops to thrive without excessive chemical inputs.
- ✦ **Increased Fertilizer Dependence and Costs:** As soil health declines, the dependency on chemical fertilizers rises, driving up the costs for farmers while worsening soil quality in the long run.
  - 📎 The shift from organic matter to synthetic fertilizers is unsustainable and creates a vicious cycle of declining soil health and increased input costs.

### 💡 Social Impacts:

- ✦ **Threat to Food Security:** Soil degradation poses a significant risk to food security, as it reduces the ability of the land to support sustainable crop production.
  - 📎 With more than **30% of India's land facing soil degradation**, the country risks being unable to meet the demands of a growing population.
  - 📎 This degradation has led to **reduced availability of nutritious crops, contributing to food insecurity, especially in rural and underserved areas.**
- ✦ **Rural Livelihoods at Risk:** Soil degradation erodes the livelihoods of millions of farmers who depend on healthy soil for their income.

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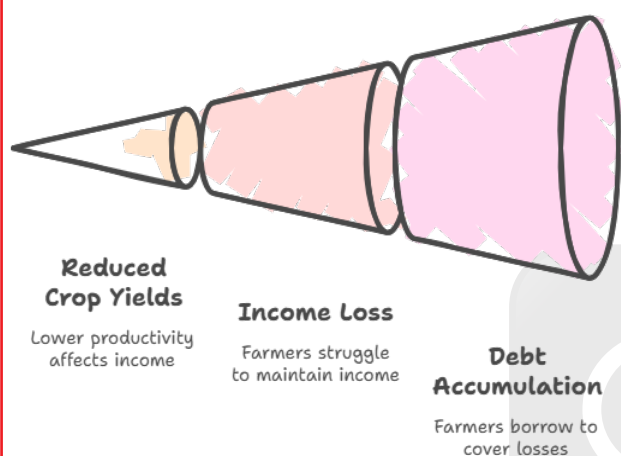


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- With falling yields, farmers are increasingly trapped in **debt cycles**, exacerbated by the rising cost of inputs like fertilizers and water.
- Many farmers are forced to abandon their lands or shift to alternative livelihoods, leading to rural depopulation and social instability.

### Soil Degradation to Debt Cycle



#### Cultural Impacts:

- ✦ **Loss of Traditional Farming Practices:** Soil degradation undermines traditional agricultural practices that were once sustainable and community-oriented.
- As the soil quality declines, these practices become less viable, and farmers are compelled to adopt intensive, chemical-driven methods that **disrupt local agricultural knowledge and traditions**.

#### Ecological Impacts:

- ✦ **Loss of Biodiversity:** Soil degradation directly impacts biodiversity by disrupting ecosystems that rely on healthy soils.
- As soil fertility declines, the capacity for diverse plant and animal species to thrive diminishes, leading to a loss of local biodiversity.
- In states like **Assam**, where **water and wind erosion** have affected vast swathes

of **agricultural land**, the disruption of soil systems has led to the destruction of habitats, putting species at risk.

- ✦ **Increased Water Pollution:** Soil degradation accelerates water pollution by carrying sediments, pesticides, and fertilizers into nearby water bodies.

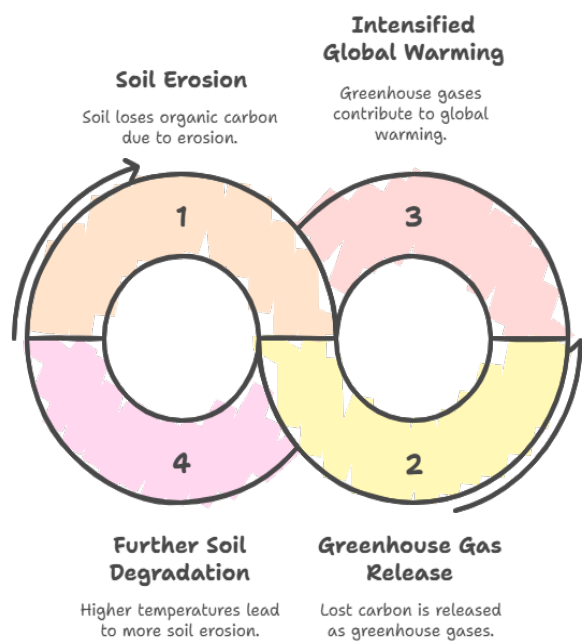
This not only harms aquatic life but also contaminates drinking water sources, making water purification more expensive.

- ✦ **Climate Change Amplification:** Soil degradation exacerbates climate change by diminishing the soil's capacity to sequester carbon, transforming it from a carbon sink into a carbon emitter.

As soils lose organic carbon due to erosion and poor management practices, the **release of greenhouse gases increases**, further intensifying global warming.

This cycle not only worsens soil health but also threatens the resilience of ecosystems against climate impacts.

### Soil Degradation and Climate Change Cycle



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## What Measures can India Adopt for Enhanced Soil Management?

- 💡 **Sustainable Fertilizer Management:** To address imbalanced fertilizer use, India must adopt a **science-based, precision fertilization approach** that ensures the right nutrients are applied in the right amounts, tailored to the specific needs of different regions.
  - ✦ This involves **promoting Variable Rate Application (VRA)** using soil health monitoring technologies and remote sensing tools.
  - ✦ Incentivizing the **use of organic fertilizers and integrating crop-specific nutrient management plans** will reduce dependency on chemical fertilizers and restore soil health in a balanced manner.
- 💡 **Integrated Pest Management (IPM) and Organic Farming:** Transitioning to organic farming methods and integrating **Integrated Pest Management (IPM)** can significantly reduce the use of harmful chemicals and improve soil health.
  - ✦ By promoting the **use of bio-pesticides, organic manures, and crop rotation**, India can **restore natural soil fertility** while reducing the environmental and health risks posed by synthetic pesticides.
  - ✦ IPM can also prevent pest resistance, thereby fostering a more sustainable agricultural ecosystem.
- 💡 **Promotion of Conservation Agriculture Practices:** India must expand the adoption of **Conservation Agriculture (CA)** practices, which include **minimal tillage, crop rotation, and the use of cover crops**.
  - ✦ These practices help conserve soil moisture, improve organic matter content, and prevent soil erosion.
  - ✦ By reducing soil disturbance and enhancing biological activity, **CA can improve long-term soil fertility and resilience, even under climate stress**. Training programs and subsidies can support farmers in adopting CA practices at scale.
- 💡 **Advancing Precision Agriculture Technologies:** Adopting Precision Agriculture (PA) technologies (like **Agri-IOT**) can optimize resource use, including **water, fertilizers, and pesticides**, thereby **improving soil health**.
  - ✦ Through the use of **soil sensors, satellite imagery, and data analytics**, PA can help farmers make informed decisions on soil health and nutrient management.
  - ✦ By implementing localized and data-driven interventions, PA can prevent overuse of inputs and ensure sustainable land use practices across diverse agro-climatic zones.
- 💡 **Afforestation and Agroforestry Initiatives:** To combat soil erosion and nutrient depletion, India must **prioritize large-scale afforestation and agroforestry programs that incorporate trees into agricultural landscapes**.
  - ✦ These practices help stabilize soil, prevent erosion, increase organic matter, and enhance biodiversity.
  - ✦ **Agroforestry** also creates **diversified income sources for farmers**, reducing their reliance on monocropping and strengthening ecosystem services such as carbon sequestration.
- 💡 **Soil Carbon Sequestration Programs:** Encouraging the adoption of soil carbon sequestration techniques, such as mulching, reduced tillage, and the use of **biochar**, can **help restore soil organic carbon levels**.
  - ✦ Carbon farming can be incentivized through carbon credit programs, allowing farmers to generate additional income while improving soil structure and fertility.
  - ✦ A national policy for **carbon farming can link environmental goals with economic benefits**, driving large-scale participation in soil restoration efforts.
- 💡 **Water-Efficient Irrigation Systems:** To mitigate soil salinization and erosion caused by excessive irrigation, India must **promote water-efficient irrigation systems, such as drip and sprinkler irrigation**.

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- ✦ These systems reduce water wastage, prevent waterlogging, and ensure the targeted application of water, thus safeguarding soil health.
- ✦ Additionally, **rainwater harvesting at the farm level can recharge groundwater supplies**, ensuring sustainable water availability and maintaining soil moisture levels during dry spells.

💡 **Strengthening Soil Health Monitoring and Data Infrastructure:** Developing a robust soil health monitoring network combined with real-time data collection using remote sensing technology will enable targeted interventions.

- ✦ By **integrating soil health data from Soil Health Cards with satellite-based soil mapping**, India can create dynamic, region-specific action plans.
- ✦ This infrastructure will empower farmers with the knowledge needed to implement localized soil management strategies, thereby improving productivity and sustainability.

💡 **Education and Capacity Building Programs:** Increasing awareness and building capacity among farmers, **agricultural extension workers**, and policymakers is essential for improving soil management practices.

- ✦ India should establish comprehensive training programs at the grassroots level that focus on sustainable soil management, conservation techniques, and climate-resilient farming practices.
- ✦ **Empowering local communities with knowledge about soil health** and its direct connection to food security can drive long-term changes in agricultural practices.

### Conclusion:

Soil degradation in India threatens not only agricultural productivity but also the nation's broader environmental and socio-economic stability. Achieving **Land Degradation Neutrality by 2030** is crucial to reversing this trend and aligning with **Sustainable Development Goals (SDGs)** like **Zero Hunger (SDG 2)**, **Clean Water and Sanitation (SDG 6)**, and **Life on Land (SDG 15)**. A comprehensive, multi-stakeholder approach is essential to restore soil health, mitigate climate change, and ensure food security for future generations.

## Advancing India UK Cooperation

*This editorial is based on “**PM Modi in the UK: Let go of the bilateral baggage**” which was published in The Indian Express on 23/07/2025. The article brings into picture the formal signing of the India-UK FTA as a turning point in bilateral ties, where both nations, as middle powers, seek to enhance each other's global influence.*

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

The formal signing of the **India-UK Free Trade Agreement Comprehensive Economic Trade Agreement (CETA) between India and the United Kingdom** during the Indian Prime Minister's recent London visit represents a pivotal moment in bilateral relations, finally bridging the gap between promise and performance that has persisted since the 1990s. The comprehensive cooperation spanning **trade, technology, defense, and education** marks a departure from past diplomatic setbacks and colonial-era resentments. As middle powers in an increasingly multipolar world shaped by **China's assertiveness and America's unpredictability**, India and Britain are positioning themselves as force multipliers for each other's global influence.

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# United Kingdom



## What are the Key Areas of Convergence between India and the UK?

- 📌 **Trade and Economic Cooperation:** India and the UK have made substantial strides in economic cooperation, with the **Comprehensive Economic Trade Agreement (CETA)** slated to boost bilateral trade.

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- ✦ The bilateral trade between India and the UK increased to **USD 21.34 billion in 2023-24**. The FTA negotiations, progressing under both Conservative and Labour governments, aim to remove tariffs on **99% of Indian exports**.

📎 India's exports to the UK grew by **12.6%** to reach **\$14.5 billion in 2024-25**.

- ✦ The **urgency is driven by post-Brexit Britain's need for diversification beyond the EU**, with India's vast and growing market seen as pivotal for the UK's economic revival.

💡 **Technology and Innovation:** The **India-UK Technology Security Initiative (TSI)**, launched in 2024, solidifies their joint focus on emerging technologies like **AI**, **semiconductors**, and **cybersecurity**.

- ✦ India's thriving tech sector and the UK's advanced research capabilities are an ideal match for innovation-driven collaboration.

- ✦ The **UK's SRAM & MRAM Technologies** has already **committed INR 30,000 crore** in India's semiconductor sector, reflecting growing tech investments.

📎 The ongoing partnership in AI research and development exemplifies the promise of this sector, with both countries focused on developing **"safe, responsible, and human-centric" AI systems**.

💡 **Defence and Security:** India and the UK have ramped up cooperation in defence, particularly in the Indo-Pacific region, where both share concerns about China's growing influence.

- ✦ The UK's support for India's maritime interests, as seen in the deployment of the **HMS Queen Elizabeth to the Indian Ocean**, showcases a united front for regional security.

- ✦ In 2023, **India's defence purchases from the UK were minimal, representing just 3% of total acquisitions**, but the 2+2 mechanism established in 2023 signals future opportunities for collaboration in defence technology transfer and military interoperability.

💡 **Climate Change and Green Energy:** The India-UK relationship has become increasingly pivotal in

addressing climate change, with both nations committing to ambitious climate goals.

- ✦ **India aims to generate 65% of its electricity from renewable sources by 2030**, while the UK targets net-zero emissions by 2050.

📎 Collaborative efforts in green technologies, particularly green hydrogen and climate finance, are key to their partnership.

- ✦ **UK-India Hydrogen Partnerships** builds on the UK-India Hydrogen Hub announced in 2022.

💡 **People-to-People and Diaspora Ties:** The **Indian diaspora in the UK, comprising over 1.6 million people**, serves as a significant bridge for people-to-people ties between both nations.

- ✦ With a high level of socioeconomic success, the **Indian-origin community in the UK contributes immensely to various sectors**, including healthcare, technology, and business.

- ✦ Additionally, **Indian-origin MPs have made their mark in British politics, with 26 MPs in the Parliament as of 2024**, showcasing the strong influence of the diaspora on political and economic matters.

💡 **Education and Research Collaboration:** The India-UK education partnership continues to evolve, with Indian students making up a significant portion of international students in the UK.

- ✦ This collaboration, exemplified by the establishment of **Southampton University's campus in India**, highlights the growing importance of educational exchanges.

- ✦ The creation of the **India Young Professionals Scheme** further supports bilateral academic mobility.

## What are the Key Areas of Friction Between India and the UK?

💡 **Migration and Visa Policies:** Migration has been a longstanding contentious issue between India and the UK.

- ✦ Despite both countries seeking closer ties, **Britain's restrictive post-Brexit immigration policies clash with India's desire for greater mobility** for its skilled professionals.

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✦ India's growing demand for easier visa access for IT workers, healthcare professionals, and students remains unmet, despite talks for liberalising visa norms.

✎ **The India-UK Free Trade Agreement (FTA) discussions were delayed partly because of the difficulty in reconciling immigration demands,** with India seeking greater mobility for professionals in key sectors like IT and healthcare.

💡 **Legal and Extradition Issues:** **Extradition** remains a sore point between the two countries, with India often accusing the UK of sheltering fugitives and denying requests for extradition.

✦ High-profile cases, such as that of **Vijay Mallya**, have highlighted this issue.

✦ Despite long-standing efforts, the UK has been hesitant to extradite individuals wanted by India for corruption, financial crimes, and terrorism.

✎ These **legal deadlocks undermine trust and complicate broader security** and economic cooperation between the nations, including potential trade agreements.

💡 **Russia-Ukraine War and Strategic Autonomy:** India's neutral stance on the **Russia-Ukraine war** has often clashed with the UK's firm support for Ukraine.

✦ While **India has expressed support for a peaceful resolution**, it has refrained from condemning Russia's actions or joining Western sanctions.

✦ India's refusal to condemn Russia outright is at **odds with the UK's broader strategy**, leading to occasional friction despite their strategic cooperation in other areas, such as defence and Indo-Pacific security.

💡 **Environmental Standards and Carbon Border Adjustment:** The UK's growing commitment to climate action, including its **Carbon Border Adjustment Mechanism (CBAM)**, creates a potential source of friction with India.

✦ India is concerned that the CBAM, set to come into effect by 2027, will disproportionately affect its carbon-intensive industries, **such as steel and iron**.

✎ This measure is seen as a form of environmental protectionism by India, as it would raise costs for its exporters.

✦ The UK's proposal to impose taxes on carbon-intensive imports like iron and steel could hit India's exports significantly, particularly given that India is the **second-largest steel producer globally**.

💡 **Rise of Extremist Activities in UK:** The UK has struggled with handling Khalistani separatist activities within its borders, which often strains India-UK relations.

✦ The presence of pro-Khalistani groups in the UK, including **protests outside the Indian High Commission**, has led to diplomatic tensions.

✦ India sees such activities as an infringement on its sovereignty, which the UK has failed to curb effectively.

✦ Despite the UK's assurances, these events continue to fuel negative perceptions in India regarding the UK's handling of extremism, affecting broader cooperation in security matters.

💡 **Trade Barriers and Tariff Disputes:** Despite the momentum towards the India-UK Free Trade Agreement (FTA), significant tariff disputes remain unresolved.

✦ India's reluctance to reduce high tariffs on **British automobiles, scotch whiskies, and agricultural goods**, coupled with the UK's desire for greater access to India's services market, remains a key issue.

✦ Both nations continue to struggle to reach consensus, as India seeks to protect its domestic industries while the UK pushes for unfettered market access.

✎ In 2023, **India maintained tariffs as high as 150% on British whisky and up to 100% on automobiles**, while the UK sought a reduction to promote its exports.

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- 💡 Under the negotiations, **tariffs on Scotch whisky will be halved to 75% immediately** and gradually reduced to 40% over the next 10 years.
  - ✦ This tariff stand-off complicates the negotiation of the FTA, highlighting the difficulty in aligning domestic priorities with trade liberalisation goals.
- 💡 **Intellectual Property and Market Access:** India and the UK have also encountered challenges regarding **intellectual property (IP) rights** and access to each other's markets.
  - ✦ **The UK's push for stronger IP protections often conflicts with India's focus on access to affordable medicines** and its domestic innovation policies.
  - ✦ India's generics industry, which produces affordable medicines for much of the world, faces pressures under global IP standards.

### What Measures can India Adopt to Enhance Ties with the UK?

- 💡 **Streamline Visa and Migration Policies:** India should engage in focused negotiations to create a more **flexible and mutually beneficial visa regime**, prioritizing skilled professionals, students, and workers.
  - ✦ By establishing bilateral agreements to **ease mobility, especially for Indian tech, healthcare, and educational professionals**.
  - ✦ **C Raja Mohan** while emphasising upon **India's Internationalisation** states that "As the world seeks out Indian talent, the diaspora, now said to be around thirty-six million, will continue to grow".
    - 📌 India can tap into this opportunity to boost people-to-people ties and address one of the key contentious issues in trade talks.
    - 📌 A **well-defined migration policy, particularly for tech talent**, will solidify India's position as a crucial partner in the UK's post-Brexit economic strategy.
- 💡 **Prioritize Technological Collaboration:** India must enhance joint research initiatives with the UK in

emerging fields such as **AI, quantum computing, and green technologies**.

- ✦ Establishing bilateral innovation hubs focused on tech startups and research can facilitate greater knowledge exchange.
- ✦ By **pushing for deeper collaboration on technological infrastructure**, India can position itself as a strategic partner for the UK in global tech leadership, reducing the technological divide and fostering sustained growth.
- 💡 **Leverage Soft Power through Cultural Diplomacy:** India should prioritize its cultural diplomacy by showcasing its rich cultural heritage and creative industries, including **films, arts, and traditional crafts, to foster stronger emotional ties with the UK**.
  - ✦ Building cultural exchange programs, especially in education, arts, and digital media, can help reduce lingering colonial narratives and enhance mutual respect.
  - ✦ This would also promote greater people-to-people connectivity, which is essential for a robust bilateral relationship.
- 💡 **Collaborate on Regional and Global Security:** India can push for a stronger partnership with the UK on security issues in the Indo-Pacific region.
  - ✦ By leading joint initiatives in **maritime security, counterterrorism, and cyber defense**, India can become an indispensable partner for the UK in promoting a rules-based international order.
  - ✦ Additionally, **closer cooperation in multilateral security frameworks like the Quad and AUKUS** can offer both countries leverage in dealing with regional and global security challenges.
- 💡 **Create Joint Research Platforms on Climate Action:** India can collaborate more extensively with the UK in addressing climate change through joint research initiatives focused on renewable energy, sustainable agriculture, and carbon capture technologies.
  - ✦ By establishing joint climate action platforms and innovation centers, **India can not only**

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align with the UK's net-zero goals but also become a leader in implementing sustainable practices, making it a central partner in the global green transition.

💡 **Enhance Trade and Investment Flows through Targeted Diplomacy:** India should actively negotiate to reduce tariff barriers, particularly in sectors like automobiles, alcohol, and textiles, while exploring ways to enhance market access for British services, including financial services and legal expertise.

- ✦ By ensuring that the FTA includes provisions for a more dynamic exchange of goods and services, India can bolster its position as a key player in the UK's post-Brexit economic ambitions.
- ✦ Moreover, India can position itself as a hub for Global Capability Centres (GCCs), leveraging its skilled workforce to attract UK firms seeking cost-effective innovation and operational efficiency.

### What Role can GCCs Play in Strengthening India-UK Relations?

💡 **Catalysts for Economic and Trade Growth:** Global Capability Centers (GCCs) serve as key drivers of economic growth in both India and the UK by facilitating cost-effective, high-quality business operations.

- ✦ GCCs help UK companies tap into India's highly skilled workforce while benefitting from its competitive cost structures.
- ✦ By expanding GCCs in India, UK firms can enhance their global competitiveness, and conversely, Indian companies in the UK can deepen bilateral economic engagement and strengthen trade ties.

💡 **Enabling Technological and Knowledge Transfer:** GCCs play a crucial role in driving innovation and the transfer of technological expertise.

- ✦ For India, these centers act as a gateway to cutting-edge technologies, particularly in sectors like IT, AI, and cybersecurity.

- ✦ UK companies that set up GCCs in India also facilitate knowledge transfer to their Indian counterparts, creating a dual benefit.

💡 **Strengthening Employment and Skill Development:** GCCs help create thousands of jobs in India and the UK, driving skill development and fostering a more skilled workforce.

- ✦ By collaborating with Indian educational institutions, UK-based GCCs provide opportunities for Indian professionals to access world-class training and development programs.

💡 **Promoting Strategic Collaboration in Innovation and R&D:** GCCs not only focus on business operations but also play a central role in research and development (R&D) activities, especially in sectors like pharmaceuticals, engineering, and healthcare.

- ✦ These centers serve as hubs for innovation, where Indian professionals work alongside UK experts on joint projects, advancing critical areas such as drug development, clean energy technologies, and engineering solutions.

### Conclusion:

India-UK relations stand at a pivotal juncture, offering immense potential for bilateral cooperation across trade, business engagement, and strategic alignment. Through diplomatic dialogue, collaboration in technology, and shared commitments to global peace and prosperity, both nations can strengthen their partnership and build a more harmonious, sustainable future together.

## India's Investment Climate and Reforms

*This editorial is based on "India's FDI challenge: In a world of shrinking investment, capital will come where there is confidence and clarity" which was published in The Indian Express on 21/07/2025. The article brings into picture the structural decline in global FDI to emerging markets, highlighting how India's net FDI has collapsed despite gross inflows rising—underscoring the need for deeper reforms, trade integration, and policy coordination to truly deserve investment.*

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**Tag:** GS Paper - 2, Government Policies & Interventions, GS Paper - 3, Liberalization, Growth & Development

Global **FDI flows** to emerging markets have plummeted from **5% of GDP in 2008 to just 2% today**, marking a structural decline rather than a temporary blip. India mirrors this paradox—while **gross FDI surged 14% to \$81 billion in FY25**, net FDI collapsed 96% to merely **\$0.35 billion due to rising repatriations**. With investment decisions increasingly driven by geopolitical alignment and trade agreements, India's recent FTA momentum positions it strategically for the global reset. The imperative is clear: **India must move beyond inviting investment to actually deserving it through deregulation, trade integration, and coordinated policy action.**

### What are the Key Factors Driving India as a Global Investment Hotspot?

#### 💡 Macroeconomic Fundamentals

- ✦ **Robust Economic Growth Amid Geo-economic Uncertainty:** Despite global headwinds and economic slowdown, India's rapid economic growth remains a cornerstone of its appeal for global investors.

- 📌 India's **real GDP was estimated to grow by 6.5% in FY 2024-25**. This growth trajectory is bolstered by expanding sectors like manufacturing, services, and construction.
- 📌 **IMF data** projects India's GDP to reach \$4.187 trillion in 2025, surpassing Japan to become the **fourth largest economy**, reflecting its robust economic standing.

- ✦ **Burgeoning Demographic Dividend:** India's young and dynamic workforce offers immense potential for foreign investors looking for long-term growth opportunities.

- 📌 **India's working age population** between 15-59 years is expected to increase to **64.9% by 2036**.

- 💡 The median age of **28.4 years ensures a steady supply of skilled labor**, making India an attractive manufacturing hub.

- 📌 This demographic advantage places India in a prime position for FDI inflows,

particularly in labor-intensive sectors like manufacturing and technology.

- ✦ **Enhanced Infrastructure and Logistics:** India's continued investment in infrastructure, particularly in transport and logistics, is a key factor attracting FDI.

- 📌 The **National Infrastructure Pipeline (NIP) and the PM Gati Shakti** initiative are transforming India's connectivity, facilitating smoother supply chain operations.

- 📌 With **about 280 operational Special Economic Zones (SEZs)** and India's position as the third-largest domestic aviation market, infrastructure development enhances the ease of doing business.

- 📌 Additionally, the government's efforts in strengthening connectivity through the **Sagarmala and Bharatmala** initiatives are enhancing India's logistics infrastructure.

#### 💡 Policy and Regulatory Reforms

- ✦ **Government Reforms and Policy Support:** India has made significant strides in liberalizing its FDI policies, ensuring an investor-friendly environment.

- 📌 The **"Make in India" initiative and the Production-Linked Incentive (PLI) Scheme** are key drivers, creating favorable conditions for foreign investments, particularly in manufacturing.

- 📌 Today, **100% foreign direct investment is permitted under the automatic route in multiple high-impact sectors**, signaling both economic confidence and strategic ambition.

- 📌 In **FY 2024-25**, India saw a **14% rise in FDI inflows**, amounting to USD 81 billion, highlighting the success of these reforms in attracting global capital.

- ✦ **Rising Focus on Green Transition:** Sectors such as **renewable energy, and electric mobility** are witnessing rising global interest, contributing significantly to FDI growth.

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- ✍ India's renewable energy sector alone has attracted over USD 6 billion in FDI from 2020 to 2023, driven by favorable policies and incentives.
- ✍ The country is also becoming a hub for **electric vehicle (EV)** investments, with companies like Hyundai and Foxconn committing substantial capital to expand production.
- ✦ **Global Hub for Health and Pharma:** India's healthcare and pharmaceutical sectors have become major FDI attractors due to a combination of strong growth prospects and government-backed incentives.
  - ✍ In FY24, hospitals in India garnered a substantial **USD 1.50 billion** in FDI, representing half of all healthcare FDI.
  - ✍ Reforms like **allowing 100% FDI in the greenfield pharmaceutical sector** and facilitating research and development investments have made India an attractive destination for global pharma companies.
- ✦ **Digital Transformation and Technological Advancements:** India's rapid digitalization is transforming it into a global tech powerhouse, attracting investments in sectors such as **fintech, e-commerce, and AI**.
  - ✍ The government's **Digital India initiative** has enabled significant strides in tech adoption, with India to host over **900 million internet users in 2025**.
  - ✍ The country's digital economy contributed **11.74% to GDP in FY 2022-23**, reflecting its vast potential for tech-based investments.
  - ✍ Major global tech firms like **Amazon and Microsoft are heavily investing in India's digital infrastructure**, capitalizing on the growing demand for online services and digital solutions. The rise of digital payment systems like **UPI further cements India's position as a digital economy leader**.

### 💡 Strategic and Geopolitical Positioning

- ✦ **Strategic Geographic Location:** India's strategic location at the crossroads of Asia provides unparalleled access to a vast **consumer market of over 3.2 billion people**.
  - ✍ As a key player in the **South Asian, Middle Eastern, and African markets**, India serves as a gateway for businesses seeking to diversify supply chains.
  - ✍ Recent agreements like the **India-UAE Comprehensive Economic Cooperation Agreement (CEPA)** underscore India's growing importance in global trade.

### What Hurdles are Limiting India's Ability to Attract Sustained Foreign Investment?

- 💡 **Regulatory Bottlenecks and Policy Uncertainty:** Despite significant reforms, India's regulatory framework still faces criticism for being complex and slow, which discourages foreign investors.
  - ✦ Regulatory uncertainties, **especially in sectors like digital laws and labor laws**, increase investment risks.
  - ✦ For instance, Draft rules for **Digital Personal Data Protection Act (DPDPA), 2023** were released for public consultation in early 2025 but **have not been finalized as of mid-2025**, leaving businesses in a "compliance limbo" with unclear requirements.
  - ✍ The **2025 Union Budget** introduced **enhanced and more frequent Registrar of Companies (RoC) and tax filing requirements**, making compliance processes more demanding.
- 💡 **Infrastructure and Logistics Challenges:** While India's infrastructure has improved, it still lags behind in certain areas, particularly logistics and rural connectivity, which hampers ease of doing business.
  - ✦ **Poor road quality, congestion at ports, and slow rail networks** significantly increase operational costs for businesses.
  - ✦ The **World Bank's Logistics Performance Index** ranked India **38<sup>th</sup> in 2023**, far behind

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other emerging economies like China, making it less attractive for time-sensitive investments.

- ✍ As of 2025, India's logistics cost stands at approximately **14% of GDP**—much higher than advanced economies. (e.g., U.S. at **7%**, Germany at **8%**).
- ✦ Such inefficiencies in logistics affect industries like manufacturing and e-commerce, further deterring investment.
- 💡 **Skilled Labor Shortages:** India's large labor force is an advantage, but a lack of advanced skills in certain sectors, especially in **technology and high-end manufacturing, remains a challenge.**
  - ✦ While the country has a youthful workforce, many investors face difficulties in finding skilled labor to meet global standards, limiting India's potential in tech-heavy sectors.
  - ✦ According to a report by Nasscom-Zinnov, India is projected to face a shortage of **14-19 lakh tech professionals by 2026.**
    - ✍ This skills gap deters investors in sectors like AI and robotics, which require specialized expertise.
- 💡 **Geopolitical Risks:** Ongoing geopolitical issues, such as **tensions with neighboring countries like Pakistan with the recent Pahalgam Attack**, can create uncertainty around long-term investments.
  - ✦ The rise in **protectionist policies in major markets like the U.S. and China** has compounded this issue, affecting global companies' investment strategies.
  - ✦ Due to this, **over 30% of global firms** now cite trade and tariff policies as their top business concern—triple the level from early 2025.
    - ✍ For example, the **recent increase in tariffs on Chinese goods has made foreign investors cautious** about aligning with India's trade policies.
- 💡 **Land Acquisition and Environmental Approvals:** Land acquisition issues continue to be a significant deterrent for foreign investments in infrastructure and manufacturing projects.
  - ✦ Despite the efforts of the government to streamline the process, obtaining land for

large-scale projects still faces legal and social challenges.

- ✦ Recent data suggest that, **nearly 700 national highway projects were officially delayed, with 35% of these delays** attributed to prolonged land acquisition disputes
- 💡 **Competition from Other Emerging Markets:** India faces stiff competition from other emerging markets like **Vietnam, Bangladesh, and Mexico**, which offer lower labor costs, simpler regulations, and more favorable business environments.
  - ✦ As **its regulatory framework** remains cumbersome in certain areas, these competitors are increasingly attracting FDI that India might otherwise have received.
  - ✦ For instance, **Vietnam's FDI growth rate has outpaced India's in 2025**, with a first-half surge of over 32%, fueled by high-value projects
- 💡 **Slow Pace of Digital and Technological Adaptation:** While India is making strides in digitalization, the pace of technological adoption remains uneven, particularly in rural areas and small businesses.
  - ✦ The **digital divide hampers the country's potential to attract high-tech investments**, particularly in sectors like e-commerce and fintech.
  - ✦ Recent studies show that **67% of Indian MSMEs are "digitally equipped,"** using tools like ERP, CRM, cloud, and digital payments.
    - ✍ But, **integration of advanced technologies (AI, IoT, analytics)** is limited, with most adoption still focused on payment, communication, and basic software
  - ✦ This disparity limits the overall investment potential, especially for businesses targeting non-urban markets.

### How can India Transform its Investment ecosystem to Align with Global Trends and Domestic Priorities?

- 💡 **Streamline Regulatory Processes:** India can significantly enhance investment by simplifying and expediting regulatory procedures.

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✦ This includes **accelerating approvals for land acquisition, environmental clearances, and construction permits**, which are often bottlenecks for large-scale projects.

✦ The government can **introduce time-bound regulatory frameworks to ensure consistency in approvals**, minimizing bureaucratic delays.

📌 Additionally, **setting up dedicated task forces for fast-tracking critical infrastructure** and manufacturing projects can create a more investor-friendly ecosystem.

💡 **Strengthen Legal and Contract Enforcement:** Improving the enforcement of contracts is essential for fostering investor confidence.

✦ India can establish **specialized commercial courts and fast-track legal processes for disputes related to business contracts**.

✦ Enhancing the efficiency of dispute resolution mechanisms and reducing judicial delays would increase India's attractiveness as a destination for long-term investments.

📌 A well-functioning legal framework ensures that **investors can rely on the stability of their agreements, minimizing perceived risks**.

💡 **Enhanced Focus on Infrastructure Development:** To attract more foreign investment, India must accelerate investments in critical infrastructure—**especially logistics, transportation, and digital networks**.

✦ Expanding and **modernizing ports, highways, and rail systems to enhance connectivity**, along with creating dedicated industrial corridors, can improve operational efficiency.

✦ Additionally, **focusing on rural infrastructure and improving last-mile connectivity will enable companies to expand into untapped markets**, boosting domestic and international investment prospects.

💡 **Develop a Skilled Workforce Through Targeted Education:** India can address the skills gap by focusing on targeted skill development programs

aligned with the needs of high-growth sectors like **AI, biotech, and advanced manufacturing**.

✦ Partnering with industry leaders to create specialized vocational training and certification programs will better prepare India's workforce for global competition.

✦ **Encouraging private-public partnerships (PPPs) in higher education**, along with the promotion of research and development (R&D) institutions, will position India as a talent hub for emerging industries.

💡 **Simplify and Stabilize the Tax System:** A **streamlined, predictable, and transparent tax system** is essential for enhancing India's investment appeal.

✦ India can introduce more tax incentives and exemptions for foreign investors, such as tax holidays in key sectors, and **further simplify the Goods and Services Tax (GST) structure to reduce compliance costs**.

✦ Stabilizing tax policies and creating a clear framework for dispute resolution in tax matters will ensure that businesses feel confident about the long-term fiscal environment.

💡 **Promote Green and Sustainable Investments:** India can position itself as a leader in the green economy by creating attractive incentives for renewable energy and sustainability-focused investments.

✦ Introducing **more green bonds, tax benefits for clean technology companies, and easing FDI regulations** in sustainable industries like electric mobility and waste management can foster environmentally-conscious investments.

✦ Additionally, India can accelerate its efforts to meet global sustainability goals by attracting investments in clean energy and green infrastructure.

💡 **Incentivize Innovation and Start-up Ecosystem:** India should adopt policies that support entrepreneurship and innovation by fostering a robust **start-up ecosystem**.

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- ✦ This includes providing greater access to venture capital through tax relief, simplifying regulations for angel investors, and setting up innovation hubs in collaboration with global investors.
- ✦ **Creating special zones for tech start-ups with easier access to funding**, tax exemptions, and global market linkages would further position India as an innovation-driven economy.
- 💡 **Enhance Ease of Doing Business at State Level:** While India has made significant progress at the national level in improving the business climate, state-specific reforms are crucial.
  - ✦ **Each state should be encouraged to create its own investment-friendly policies**, focusing on reducing local red tape and improving infrastructure.
  - ✦ **Introducing an “Investment Friendliness Index” for states**, ranking them on the ease of doing business, tax incentives, and land availability, will motivate states to compete for global capital and foster a more decentralized investment environment.
- 💡 **Encourage Digital Transformation Across Sectors:** To enhance investment, India can invest in building a robust digital infrastructure that spans both urban and rural areas.
  - ✦ The government should promote **e-commerce, fintech, and blockchain technologies** by creating policies that encourage digital payments, financial inclusion, and cyber security.
  - ✦ Offering incentives for **tech-based businesses that focus on digital solutions, cloud computing, and AI** can further solidify India's role in the global digital economy.
- 💡 **Strengthen Trade Partnerships and Free Trade Agreements (FTAs):** India must continue to negotiate and strengthen free trade agreements (FTAs) with key global economies, focusing on sectors with high investment potential.
  - ✦ **Expanding FTAs with Canada and the EU** and establishing deeper economic ties with emerging markets will provide investors with broader access to markets.

- ✦ **Facilitating smoother cross-border trade and eliminating tariffs on key goods and services** can attract more global companies looking to use India as a gateway to the broader Asian market.

### Conclusion:

India's investment landscape presents vast potential, driven by its strong economic growth, youthful labor force, and progressive policy reforms. By streamlining **regulatory processes, enhancing logistics and digital infrastructure, and focusing on targeted skill development**, India can attract sustained foreign direct investment (FDI) and emerge as a leading investment destination in the global economy.

## Unraveling the Roots Of LWE in India

*This editorial is based on “Left Wing Extremism is a smokescreen. Maharashtra’s new law could criminalise dissent” which was published in The Indian Express on 25/07/2025. The article brings into picture the risks of Maharashtra’s new bill on Left Wing Extremism blurring the line between dissent and violence, while emphasizing that lasting solutions lie in addressing the socio-economic roots of extremism rather than relying solely on punitive measures.*

**Tag:** GS Paper - 3, Left Wing Extremism, Terrorism in Hinterland & Border Areas

The Maharashtra legislature's recent bill targeting **Left Wing Extremism (LWE)** reflects a broader national challenge in **addressing ideological violence while preserving democratic freedoms**. The legislation's definitions and expansive scope risk criminalizing legitimate dissent and criticism, **blurring the lines between violent extremism and constitutional rights to free expression**. Rather than relying solely on punitive legislation with unclear boundaries, India must focus on **dismantling the socio-economic roots that fuel extremism—addressing inequality, governance failures, and developmental deficits** that create fertile ground for radical ideologies.

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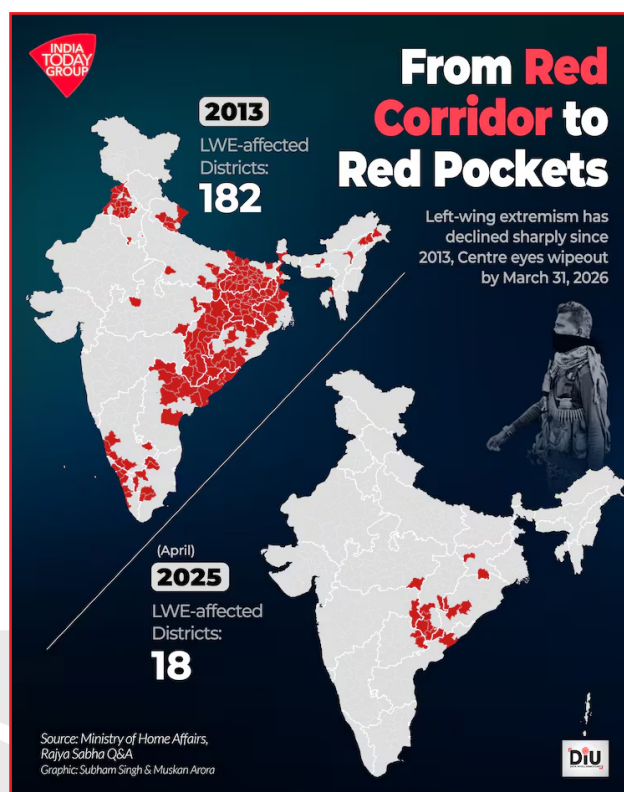


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## What are the Key Breakthroughs of India in Combating Left Wing Extremism?

- 💡 **Enhanced Intelligence and Counter-Terrorism Capabilities:** The strengthening of India's intelligence capabilities has been crucial in breaking the backbone of LWE groups.
  - ✦ With the creation of the **National Investigation Agency (NIA)** and an uptick in joint intelligence-sharing between states, the security forces have managed to **neutralize 290 Maoists** in 2024 alone.
  - ✦ The significant enhancement of **Special Intelligence Branches** and **fortified police stations** has bolstered the capacity to target and dismantle insurgent networks.
- 💡 **Strategic Military Successes and Tactical Operations:** India's security forces have shown increased operational success against Maoist factions.
  - ✦ For instance, the **Karreguttalu Hill operation (Operation Black Forest)** in 2025, which led to the neutralization of **31 Maoists** with zero casualties on the side of security forces, exemplifies the efficiency and precision of counter-LWE operations.
  - ✦ Over **8,000 Maoists** have surrendered over the last decade, reflecting how military pressure has forced many insurgents to abandon violence and reintegrate into society.
- 💡 **Bilateral Cooperation Between States:** Cooperation among LWE-affected states has played a pivotal role in reducing Maoist influence.
  - ✦ The **coordinated operations** between Chhattisgarh, Jharkhand, and Odisha led to **the dismantling of key Maoist strongholds in the Red Corridor.**
  - ✦ The geographical spread of LWE violence has also constricted substantially with reduction of LWE affected districts from **126 across 10 states in 2013 to only 38 districts in 2024** across 9 states, demonstrating the positive impact of strong interstate cooperation.
    - 📎 These states share intelligence, resources, and conduct joint operations, ensuring a **unified front** against the insurgency.



- 💡 **Community-Based Peacebuilding and Civic Programs:** Civic action programs have helped in **Winning Hearts and Minds (WHAM)** of local populations and reducing support for Maoists.
  - ✦ The **Civic Action Programme (CAP)**, with a **budget of ₹196 crore** for the last five years, has helped build a rapport between security forces and local communities.
  - ✦ **Tribal Youth Exchange Programs (TYEP)** have also fostered social integration by providing tribal youth with opportunities to engage with the mainstream culture, reducing Maoist recruitment in tribal areas.
- 💡 **Holistic Rehabilitation for Former Maoists:** India's emphasis on rehabilitating former insurgents through targeted rehabilitation programs has been crucial.
  - ✦ The **Chhattisgarh government's surrender policy**, which offers financial support and vocational training along with **increased compensation, land and job opportunities**, has successfully reintegrated former militants

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back into society, depriving the insurgency of critical human resources.

💡 **Targeted Welfare and Development Schemes:** The government has launched tailored welfare initiatives to uplift the most vulnerable populations in LWE-affected regions.

✦ The “**Dharti Aaba Janjatiya Gram Utkarsh Abhiyan**”, launched in **October 2024**, aims to provide basic amenities to **1.5 crore tribals** across **15,000 villages**.

✦ Enhanced infrastructure projects, such as the **construction of over 17,000 km of roads** and **7,768 telecom towers**, indicates that security and development go hand-in-hand.

✦ Additionally, **Rs. 3,563 crore** has been allocated under the **Special Central Assistance Scheme (SCA)** for bridging infrastructure gaps in these regions, ensuring that the local populations are less dependent on Maoist-controlled systems.

💡 **Empowering Local Governance and Law Enforcement:** The empowerment of local police forces has played a crucial role in the government’s success.

✦ **612 fortified police stations**, up from **66 in 2014**, have provided much-needed infrastructure to local law enforcement.

✦ The **Security Related Expenditure (SRE)** scheme has provided **₹3,260 crore** in operational funding to affected states, facilitating the modernization of police forces.

📎 These efforts have enabled state police to take the lead in counter-LWE efforts, reducing the reliance on central forces and improving local security control.

### What are the Key Factors Behind Persistence of LWE in India?

💡 **Socio-Economic Inequality and Marginalization of Tribal Communities:** The persistence of Left Wing Extremism (LWE) is largely due to **deep-rooted socio-economic inequalities**, particularly among tribal communities.

✦ Despite government initiatives, regions most affected by LWE remain economically backward, lacking basic services like **education, healthcare, and infrastructure**.

✦ For instance, according to a report by the **Ministry of Tribal Affairs, Government of India**, **only 10.7% of the tribal population has access to tap water**, highlighting a significant gap in basic infrastructure.

💡 **State-Society Disconnect and Governance Failures:** In many LWE-affected areas, there is a significant disconnect between the **state and local populations**, often exacerbated by weak governance and poor law enforcement.

✦ The lack of adequate policing and administrative presence in these regions allows Maoists to exploit governance gaps.

✦ For instance, **remote areas of Jharkhand and Madhya Pradesh** still lack **basic police stations**.

📎 This **absence of governance structures** creates a vacuum that Maoists fill, enabling their influence to persist.

💡 **Maoist Ideology and Resistance to Mainstream Politics:** The ideological appeal of Maoism remains strong in certain regions, as it positions itself as a **revolutionary alternative to India’s democratic institutions**.

✦ Maoist groups claim to fight for the rights of the oppressed (**jal jangal jameen**), particularly tribals, yet their methods, including wrongdoings and extortion, hinder development.

✦ For instance, in Odisha’s Malkangiri district, Maoists have been reported to extort money from villagers involved in **illegal cannabis cultivation**.

📎 This **illicit activity not only funds the insurgency but also entangles local communities in criminal enterprises**, further hindering lawful economic development.

💡 **Resource-rich Areas Fueling LWE:** Critics argue that LWE thrives in resource-rich regions where exploitation by both the **state and private corporations** has led to widespread discontent.

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✦ The extraction of resources like coal, minerals, and timber in **Chhattisgarh** and **Jharkhand** has often displaced indigenous populations without adequate compensation.

✦ For example, in **Hasdeo Arand**, tribal leaders have raised concerns over **coal mining**, which leads to displacement and loss of livelihoods.

✍ Maoists capitalize on this exploitation narrative, **portraying themselves as defenders of local rights against corporate greed**.

💡 **Inadequate Implementation of Development Schemes:** While India has implemented several development schemes to counter LWE, the ground-level execution remains inadequate.

✦ Programs **targeting infrastructure, health, education, and financial inclusion** often fail to reach remote regions due to corruption, inefficiency, and lack of political will.

✦ For instance, although **17,589 km of roads** have been constructed under the Road Requirement Plan, **many LWE-affected areas** in **Madhya Pradesh** and **Odisha** still remain inaccessible, enabling Maoist forces to operate freely in those pockets.

✍ The delayed or improper execution of welfare schemes stunts the growth of these areas, allowing LWE to persist.

💡 **External Support and Funding for Maoist Groups:** Maoist insurgents continue to receive both internal and external support, both in **terms of resources and ideological backing, which perpetuates the movement**.

✦ This external backing enables the insurgents to operate despite the government's counter-insurgency operations.

✦ For instance, a Kerala-based individual was arrested for allegedly trying to set up a Maoist-controlled NGO network in Jammu and Kashmir.

✍ Also, in the recent past, **China and Myanmar were accused of providing both ideological and material support** to Maoist insurgents in India.

💡 **Recruitment of Youth and Use of Guerrilla Tactics:** Maoist insurgents have managed to recruit youth, particularly from tribal regions, by offering an outlet for frustration and discontent.

✦ For instance, the **People's Liberation Guerrilla Army (PLGA)**, the armed wing of CPI (Maoist), continues to carry out sophisticated guerrilla warfare tactics, making it difficult for security forces to gain full control.

✦ Although over **8,000 Maoists** surrendered in the past decade, **Maoists still manage to sustain their ranks through continued recruitment of young tribals** who face limited opportunities in their communities.

### What Measures can India Adopt to Dismantle the Roots of Terrorism?

💡 **Strengthening Local Governance and Decentralized Administration:** To dismantle the roots of Left Wing Extremism (LWE), India must focus on **empowering local governance structures, particularly in remote and tribal areas**.

✦ Decentralized administration can facilitate faster responses to grievances and ensure that development schemes reach the grassroots level.

✦ **Empowering local leaders and increasing their involvement in decision-making** would ensure that the concerns of tribal and marginalized communities are addressed promptly, thereby reducing the appeal of extremist ideologies.

✍ A **more localized approach would also enhance accountability** and transparency in governance.

💡 **Enhanced Focus on Social Justice and Land Reforms:** A comprehensive social justice framework is critical for addressing the grievances that fuel LWE.

✦ **Land reforms, particularly the redistribution of land to tribal communities**, would provide a sense of ownership and security to marginalized groups.

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- ✦ **Strengthening the implementation of the Forest Rights Act**, which ensures tribal communities' rights to forest land, can address historical injustices and provide economic stability.
- 💡 **Promotion of Rural Employment and Livelihood Programs:** To counter the economic factors driving youth towards Maoist insurgency, India must scale up rural employment and livelihood programs.
  - ✦ Focusing on creating **sustainable livelihoods**, particularly in LWE-affected areas, would reduce dependency on illegal activities.
  - ✦ This could be achieved by integrating tribal youth into the broader economic framework through **vocational training, entrepreneurship programs, and community-driven agriculture models**.
- 💡 **Intensifying SMART and Community Policing and Building Trust:** **Community policing** initiatives can create stronger ties between law enforcement and local populations, making it harder for extremist elements to thrive.
  - ✦ Security forces should engage in **civic action programs** that go beyond counterinsurgency operations and focus on community welfare, trust-building, and conflict resolution.
  - ✦ In line with the **SMART Police vision**—**Strict and Sensitive, Modern and Mobile, Alert and Accountable, Reliable and Responsive, Tech-savvy and Trained**—such efforts should be strategic and people-centric, fostering accountability and trust in conflict-affected regions.

### SMART Police Qualities



#### Strict and Sensitive

Upholding the law with empathy and understanding.



#### Modern and Mobile

Utilizing current technology for rapid deployment.



#### Alert and Accountable

Vigilant and responsible for actions and outcomes.



#### Reliable and Responsive

Dependable and quick to address community needs.



#### Tech-savvy and Trained

Proficient in technology and well-prepared for duty.

- 💡 **Strategic Anti-Maoist Ideological Campaigns:** India needs a concerted, well-planned ideological counteroffensive to challenge the narratives spread by Maoist groups.
  - ✦ This could involve launching **nationwide awareness campaigns** that focus on the destructive impact of violence, particularly on tribal populations.
  - ✦ **Collaborating with local influencers, activists, and intellectuals** who are not aligned with Maoist ideology would help promote peace, democracy, and the benefits of development.
    - ✍ Such campaigns should focus on **empowering communities** with knowledge of their rights and the state's willingness to address their concerns peacefully.
- 💡 **Streamlining and Expanding Infrastructure Projects:** The government should fast-track the completion of infrastructure projects in LWE-affected areas, particularly those related to **road connectivity, telecommunications, and electricity supply**.

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- ✦ Access to improved infrastructure helps to break the isolation that LWE groups thrive on.
- ✦ This will also aid in integrating remote areas into the national economy and providing access to education, healthcare, and markets.
- ✦ Expedited infrastructure development, alongside **public-private partnerships**, can ensure that **rural areas are not left behind**, **reducing the economic gaps that extremists exploit**.

💡 **Revamping Education Systems with Focus on Tribal Communities:** India should prioritize **inclusive education systems** that address the specific needs of tribal students, focusing on building local educational institutions like **Eklavya Model Residential Schools** and **vocational training centers**.

- ✦ Alongside standard education, programs that teach **critical thinking** and provide knowledge about democratic values can counter the Maoist narrative.
- ✦ This approach would empower youth, providing them with alternative avenues to Maoist recruitment and offering a brighter future.

💡 **Enhancing the Role of Technology in Development and Security:** Leveraging **advanced technology** can significantly aid both development and security in LWE-affected regions.

- ✦ This includes the use of **drones** for surveillance, **GIS mapping** for tracking insurgent movements, and **big data analytics** to predict areas of potential unrest.
- ✦ On the development side, **digital platforms** can be used for delivering government schemes more effectively, ensuring **financial inclusion** and **access to services** in remote areas.

💡 **Re-envisioning Rehabilitation through Cultural Revitalization Programs:** Rehabilitation programs

should go beyond employment and vocational training, focusing on **cultural revitalization** and **identity preservation**.

- ✦ This could involve promoting traditional art forms, languages, and cultural practices in tribal areas, which would help local communities reclaim their heritage from insurgent ideologies.
- ✦ Additionally, integrating **cultural preservation into school curriculums** can instill pride in local identity, weakening the appeal of Maoist propaganda that often portrays these communities as victims of cultural erasure.

💡 **Strengthening Rural Cooperative Models:** To counter economic vulnerability, India can promote and support **rural cooperative models** that empower local communities, particularly tribals.

- ✦ These cooperatives, **focusing on agriculture, handicrafts, and forest products**, can offer a sustainable and collective economic base that discourages Maoist influence.
- ✦ By providing **micro-loans**, training in **cooperative management**, and direct access to markets, the government can help create self-sustaining economic ecosystems that are less reliant on insurgent-led exploitation.

💡 **Enhanced Border Security and Resource Control:** Maoists often operate across state borders and benefit from external resource channels.

- ✦ Strengthening **border security** and enforcing more stringent controls over cross-border trafficking of weapons and finances can significantly disrupt Maoist logistics.
- ✦ A dedicated **cross-border coordination unit** involving multiple states and intelligence agencies could work on curbing the flow of arms, ammunition, and funds, preventing Maoist factions from regrouping and scaling up operations.

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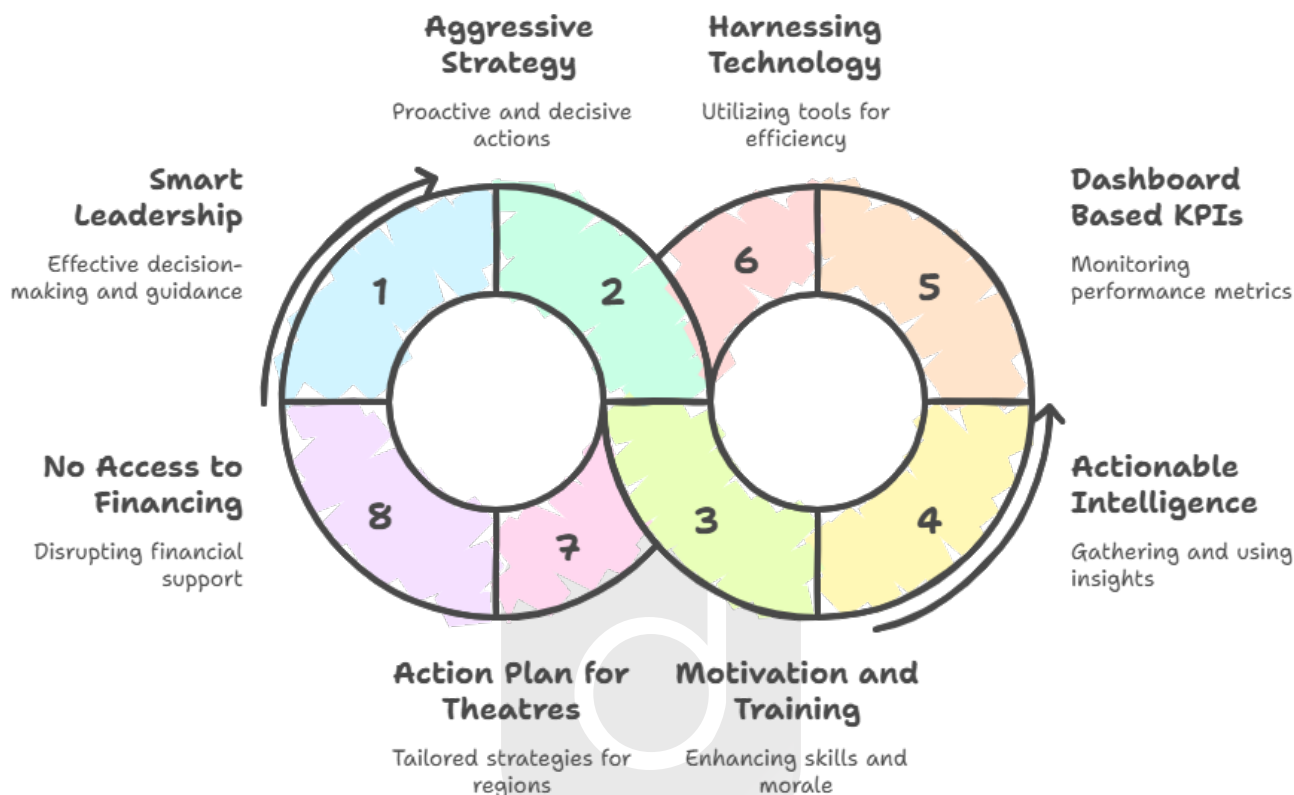
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## SAMADHAN Doctrine



### Conclusion:

The **SAMADHAN doctrine** highlights that development is key in addressing the root causes of **Left Wing Extremism (LWE)**. By focusing on economic empowerment, infrastructure, and education, India can reduce the appeal of insurgency. **Integrating communities into mainstream development ensures they have a stake in peace**, weakening LWE's support base. **Coupled with effective security, development can provide lasting solutions**, proving that growth and inclusion are critical in dismantling extremism.

## India's Path to Sustainable Air Quality

*This editorial is based on "**NCAP 2.0 must focus on industrial reform to ensure cities have clean air**" which was published in The Indian Express on 24/07/2025. ChatGPT said: The article brings into picture the stark gap between industrial contributions to air pollution and the minimal NCAP funding allocated to address them, highlighting the need for a comprehensive strategy that treats clean air as an environmental and economic priority.*

**Tag:** GS Paper - 3, Environmental Pollution & Degradation, GS Paper - 2, Government Policies & Interventions

**India's air pollution crisis** is deeply intertwined with industrial emissions, as nearly 37% of the country's most polluted cities are flanked by large industries like thermal power plants and manufacturing units. Despite industries being primary polluters in 20 percent of these cities, only **0.6 percent** of **National Clean Air Programme** funds are

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allocated to control industrial emissions, revealing a critical mismatch between problem identification and resource allocation. As India prepares for **NCAP 2.0**, beyond sectoral fixes and regulatory measures, **India must commit to a comprehensive national effort that prioritizes air quality control** as both an environmental imperative and economic necessity for sustainable development.

### What are the Key Factors Contributing to Rising Air Pollution in India?

💡 **Persistent Vehicular Emissions:** Vehicular emissions are one of the largest contributors to the growing air pollution crisis in India.

✦ As cities expand and the number of vehicles increases, the release of harmful pollutants, **particularly PM2.5 and nitrogen oxides**, becomes more pervasive.

📌 For instance, the annual **air quality report by IQAir** ranked Delhi as one of the most polluted capital cities globally with **PM2.5 concentrations** reaching **108.3  $\mu\text{g}/\text{m}^3$** , far exceeding the **WHO's safe limits**.

✦ These high pollution levels are exacerbated by the growing dependence on private cars over public transportation, increasing vehicular emissions.

💡 **Unchecked Growth in Manufacturing and Power Sectors:** Industrial emissions are another significant cause of air pollution, particularly in **states with dense manufacturing hubs**.

✦ **Thermal power plants**, cement plants, and steel smelters release large quantities of particulate matter (PM), sulfur dioxide ( $\text{SO}_2$ ), and nitrogen oxides ( $\text{NO}_x$ ).

✦ Despite regulations, industrial units often lack effective pollution control technologies, contributing heavily to the air quality crisis.

📌 About **78% of India's 537 or so thermal power plant units do not have to install machinery** to reduce  **$\text{SO}_2$  emissions** called **Flue Gas Desulfurization systems (FDGs)**.

✦ The **World Bank** estimates that air pollution costs India's economy **\$95 billion annually** in lost productivity and premature deaths.

💡 **Crop Residue Burning- Seasonal Spike in Air Pollution:** The seasonal practice of crop residue burning though reduced recently in northern states like Punjab and Haryana **still exacerbates air pollution during the harvest season**.

✦ This practice releases significant amounts of **carbon monoxide**, **PM2.5**, and **black carbon into the atmosphere**, contributing to smog formation.

✦ Though stubble burning cases have declined in Punjab, **Uttar Pradesh has, conversely, witnessed a 25% rise in such incidents**.

💡 **Residential Biomass Burning:** Biomass burning for cooking and heating remains a common practice in rural and urban households, contributing to indoor and outdoor air pollution.

✦ Despite efforts like the **Ujjwala Yojana**, which has provided LPG connections to millions, many households still rely on **coal, wood, and crop residues**, which release harmful particulates into the air.

✦ In cities like **Varanasi** and **Kanpur**, residential emissions account for more than **30% of PM2.5 pollution**.

✦ Multiple studies show that air pollution in rural areas is as severe as in urban areas, and about **70% of premature deaths from air pollution happen in villages**, largely contributed by household pollution.

💡 **Meteorological and Geographic Factors:** Meteorological conditions significantly impact the dispersion and concentration of air pollutants, especially in winter when temperature inversions trap pollutants close to the ground.

✦ **Satellite-based data** from NASA also showed that **aerosol pollution** has a significant role in exacerbating local temperature, highlighting a complex challenge where efforts to control pollution may inadvertently worsen heat risks, further complicating air quality management.

✦ This phenomenon leads to **higher concentrations of PM2.5 in cities like Delhi**, which often experience pollution spikes during November and December.

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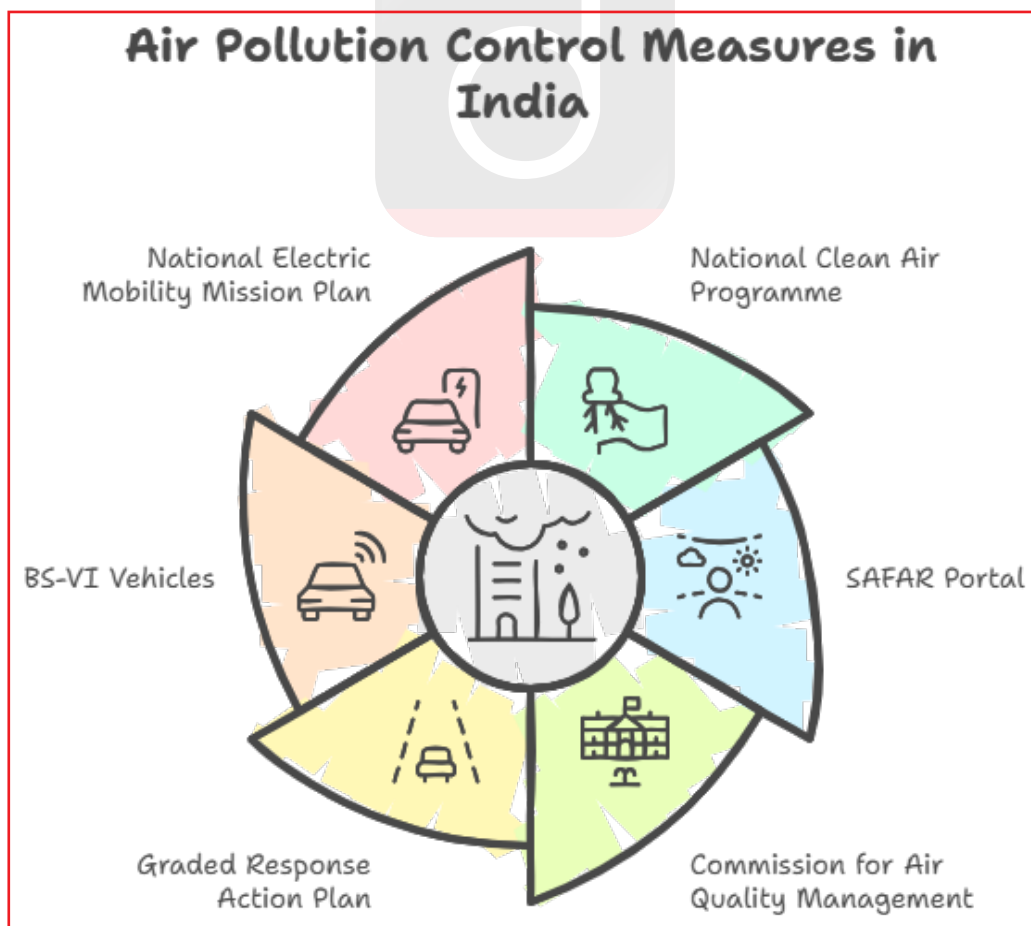
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- ✎ During the **2024 episode**, Delhi recorded a PM<sub>2.5</sub> concentration of 104.08 micrograms per cubic metre, leading to **severe air quality crises**.
- 💡 **Poor Waste Management:** The improper disposal of waste, particularly in urban areas, contributes significantly to air pollution.
  - ✦ **Open burning of waste**, including plastic, leads to the release of harmful pollutants like dioxins, furans, and particulate matter.
  - ✦ Studies suggest that depending on the city, **2% to 24% of the municipal solid waste (MSW) generated in cities gets burned**, adding to the local air pollution.
  - ✦ This practice is responsible for a large portion of the **PM<sub>2.5</sub> pollution** in urban centers, adding to the deteriorating air quality.
- 💡 **Climate Change Exacerbating Pollution Problem:** India's vulnerability to climate change is intricately linked with the growing air pollution levels, creating a feedback loop.
  - ✦ India's greenhouse gas emissions reached their highest global share of 7.8% **since 1970**.
    - ✎ More worryingly, the **rate of emissions growth has accelerated in recent years**, rising by **nearly 1% point between 2020 and 2023 alone**.
  - ✦ **Increased temperatures due to climate change** can intensify the formation of ground-level ozone and increase the frequency and severity of **heatwaves**. This, in turn, worsens air quality and increases the health burden.



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## What are the Key Shortcomings Limiting the Effectiveness of India's Air Pollution Control Initiatives?

- 💡 **Lack of Stringent Enforcement of Environmental Regulations:** Although India has regulations in place to curb emissions, the lack of stringent enforcement and monitoring results in ineffective air quality control.
  - ✦ Many industries, particularly in **small-scale sectors**, do not comply with pollution control guidelines.
  - ✦ The **Central Pollution Control Board's (CPCB) guidelines** for fugitive dust from stone crushers and brick kilns **are often ignored**, leading to high particulate matter levels in cities like **Greater Mumbai**.
- 💡 **Inadequate Monitoring Coverage:** Out of 130 NCAP cities, **28 still lack continuous ambient air quality monitoring stations**.
  - ✦ In cities with monitoring infrastructure, interruptions and incomplete data coverage reduce the ability to fully assess air pollution trends and enforce regulations effectively.
- 💡 **Lack of Focus on PM2.5 and Missed PM10 Targets:** Although India's air quality management efforts have gained momentum, there is an ongoing **focus on PM10 particles**, which are less harmful than PM2.5.
  - ✦ Also, despite focus on PM10, **only about 41 of 97 monitored cities have achieved the initial NCAP goal of 20–30% PM10 reduction**, and many cities still report PM10 levels exceeding National Ambient Air Quality Standards (NAAQS).
- 💡 **Insufficient Focus on Informal and Small-Scale Industries:** The bulk of air pollution in India is not solely from large industries but also from small-scale, informal sectors like **brick kilns, rice mills, and stone crushers**.
  - ✦ These industries often use outdated technologies and lack basic pollution control mechanisms.
  - ✦ About **10-15% of total emissions from the industrial sectors are emitted through the**

**MSME's operations**, but the focus of national initiatives like NCAP remains on larger sources.

- ✍ Without addressing the informal sector and incentivizing small industries to adopt cleaner technologies, such as **zigzag technology** for brick kilns or **biomass gasifiers** for rice mills, pollution levels will remain high.
- 💡 **Underutilization of Technology in Pollution Monitoring and Management:** While India has made strides in **monitoring air pollution**, the use of advanced technologies, such as **low-cost sensors** and **satellite data**, remains underdeveloped.
  - ✦ Despite the **Indian Institute of Technology Kanpur (IIT-K)** developing low-cost sensors for pollution monitoring, these innovations are not widely adopted in policymaking.
  - ✦ The **National Clean Air Programme** lacks the integration of real-time monitoring systems, which would enable more **data-driven interventions**.
    - ✍ Furthermore, the **underutilization of satellite-based remote sensing** to track vehicle emissions and industrial pollution in real-time limits the ability to target pollution sources effectively.
- 💡 **Over-Reliance on Short-Term Solutions:** India's initiatives often focus on **short-term solutions** that do not address the long-term structural causes of air pollution.
  - ✦ For example, the use of **mechanized street sweepers** and **aerosol seeding** to reduce dust in cities like **Delhi** has proven ineffective in the long run.
  - ✦ While these interventions offer temporary improvements, they fail to address **root causes** such as **vehicular emissions, biomass burning and industrial pollution**.

## What are the Key Implications of Rising Air Pollution in India?

- 💡 **Air Pollution as a Public Health Crisis:** Rising air pollution in India is causing a severe public health crisis, leading to increased incidences of respiratory and cardiovascular diseases.

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- ✦ **Fine particulate matter (PM2.5)** is particularly harmful, causing illnesses such as asthma, stroke, and heart disease.
- ✦ Air pollution took the **lives of 2.1 million in India in 2021**, including over 1.6 million children under 5.
- 💡 **Economic Loss and Productivity Decline:** The economic cost of air pollution is staggering, impacting productivity, healthcare costs, and overall economic growth.
  - ✦ Air pollution leads to reduced **labor productivity**, directly affecting the workforce.
  - ✦ In 2019, air pollution was estimated to cause a loss of **\$36.8 billion**, which accounts for **1.36% of India's GDP**.
    - 📎 A study suggests that **if India had achieved safe air quality levels, its GDP would have increased by \$95 billion in 2019**, illustrating the significant economic opportunity lost due to poor air quality.
- 💡 **Declining Urban Air Quality and Liveability:** Rising air pollution makes urban living increasingly difficult, particularly in megacities like **Delhi, Kolkata, and Mumbai**. Air pollution decreases **quality of life** by reducing visibility, causing smog, and limiting outdoor activities.
  - ✦ In **M.C. Mehta vs. Union of India**, the Supreme Court treated the **right to live in a pollution free environment** as a part of fundamental right to life under Article 21 of the Constitution.
  - ✦ Such hazardous levels directly **affect the mental and physical well-being of urban dwellers**, causing stress, reducing the appeal of city living, and leading to migration from affected areas.
- 💡 **Disproportionate Impact on Vulnerable Populations:** The rising levels of air pollution in India disproportionately affect **vulnerable populations**, including children, the elderly, and low-income groups.
  - ✦ Studies show that **women and children** are particularly vulnerable to indoor pollution caused by **biomass burning**.

- ✦ Exposure to indoor air pollution increases the risk of **acute respiratory infections (ARIs)** in children under five years of age.

💡 **Threat to Ecosystems and Biodiversity:** Rising air pollution is also contributing to significant environmental degradation, affecting ecosystems and biodiversity.

- ✦ Pollutants like **sulfur dioxide (SO<sub>2</sub>)** and **nitrogen oxides (NO<sub>x</sub>)** lead to **acid rain**, which damages forests, aquatic ecosystems, and crops.
- ✦ Acid rain leaches essential nutrients like **calcium and magnesium from soils, weakening plant defenses** and making them more susceptible to environmental stressors such as drought, disease, and pests.

#### What are the Technology-Based Innovations to Curb Air Pollution in India?

- 💡 **WAYU Air Purification Units at Traffic Intersections:** These localized air purifiers help mitigate the effects of vehicular emissions, significantly improving air quality in high-traffic areas.
- 💡 **Ionisation Technology for Pollution Reduction:** **Ionization technology** was tested to neutralize pollutants in the air through ionization processes. The technology holds potential for further reducing ambient air pollution in targeted regions.
- 💡 **Medium/Large-Scale Smog Towers:** **Smog towers**, large-scale air purifiers, were deployed to reduce particulate matter and pollutants over a broader area, improving air quality in densely polluted urban zones.
- 💡 **Retrofitting Emission Control Devices in Old Vehicles:** A project was launched to **retrofit older vehicles (BS III standard) with emission control devices**, aiming to reduce the pollution from vehicles adhering to outdated emission standards.

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💡 **Indigenous Photonic System for Air Quality Monitoring:** The Department of Science and Technology (DST) developed an indigenous **photonic system** for real-time, remote air quality monitoring, enhancing the accuracy of pollution data and supporting better decision-making.

💡 **Advancements in Electric Vehicle (EV) Autonomous Technology:** The DST National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS) supported the integration of **autonomous navigation technology** in EVs, aiming to reduce traffic congestion and lower **greenhouse gas emissions** through optimized driving patterns.

### What Measures can India Adopt to Effectively Address the Issue of Air Pollution?

💡 **Expanding Low-Cost, Real-Time Air Quality Monitoring Technologies:** India should prioritize the widespread adoption of **low-cost, real-time air quality sensors** in urban and rural areas, including industrial zones and transportation corridors.

✦ These sensors, paired with **satellite data** and **advanced analytics**, can help identify pollution hotspots and provide continuous monitoring to inform local policies.

✦ Real-time data can be used to trigger immediate interventions, such as **traffic regulation** or **industrial shutdowns**, when pollution levels reach hazardous thresholds.

📎 Implementing dynamic **Air Quality-Based Tolling** based on real-time air quality data to discourage driving on high-pollution days in critical zones.

💡 **Transitioning to a Circular Economy for Waste Management:** To address the massive contribution of waste burning to air pollution, India should adopt a **circular economy model** that focuses on reducing waste generation, improving recycling, and reducing the reliance on open burning.

✦ Encouraging **waste segregation** at the household level, alongside building efficient **waste-to-energy** plants, can drastically reduce the burning of plastic, wood, and other harmful materials.

✦ **Municipalities should incentivize composting and recycling initiatives** (e.g., Indore Model) through subsidies, and stricter penalties should be imposed on unauthorized waste burning to ensure compliance.

💡 **Integrating Urban and Regional Air Quality Action Plans:** India should adopt an **airshed-based management approach**, where air quality policies are developed at the **regional level** rather than merely at the city level.

✦ This would involve designing **regional air quality action plans** that account for cross-jurisdictional pollution sources such as **agricultural residue burning**, industrial emissions, and transboundary pollution.

✦ Researching and implementing biological air purification systems, **such as large-scale bio-filters and "living walls"** or vertical gardens in urban areas, which can naturally absorb pollutants.

✦ Recent emphasis on **Performance-based funding**, where cities are incentivized to achieve targets like a **15% annual pollution reduction**, is a noteworthy initiative by the Indian government.

📎 This approach should be scaled up and enforced more rigorously.

💡 **Accelerating the Adoption of Clean Transport Infrastructure:** India must fast-track the transition to **electric vehicles (EVs)** by strengthening the **EV charging infrastructure**, offering attractive **subsidies**, and introducing **tax incentives** for EV manufacturers and consumers.

✦ Alongside this, promoting **public transport** systems powered by **electricity** or **alternative fuels** will reduce pollution from the transportation sector, which is a major contributor to air quality deterioration.

✦ Integrating **non-motorized transport infrastructure** (e.g., **dedicated bicycle lanes** and **pedestrian-friendly streets**) will also reduce dependence on private vehicles, helping to further cut down emissions.

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💡 **Enforcing Stringent Industrial Retrofit and Modernization Policies:** India must implement stringent policies to ensure industries adopt **cleaner technologies** and **energy-efficient processes**.

- ✦ Mandatory **retrofitting** of old industrial units with advanced pollution control devices like **electrostatic precipitators (ESPs)**, **fabric filters**, and **wet scrubbers** can significantly cut emissions.
- ✦ Additionally, offering **financial incentives** such as low-interest loans or tax breaks for industries to switch to **sustainable fuel sources** and **energy-efficient systems** will motivate private sector participation.

💡 **Phasing Out Subsidies for Fossil Fuels:** To drive a long-term reduction in air pollution, India must phase out **subsidies for fossil fuels** and reallocate funds toward supporting **renewable energy technologies** like **solar**, **wind**, and **bioenergy**.

- ✦ Policies should encourage the adoption of **distributed solar generation** at the household and industrial levels, along with promoting **energy storage systems** to reduce dependency on coal-based power plants.
- ✦ A robust **carbon pricing mechanism**, along with **taxation on carbon-intensive industries**, can shift the economic landscape towards clean energy, making it more competitive and appealing to investors.

💡 **Expanding and Upgrading Green Urban Spaces:** India should invest in creating and upgrading **green spaces** within urban areas to act as natural **carbon sinks** and reduce ambient pollution levels.

- ✦ Expanding **urban forests**, **green roofs**, and **vertical gardens** can help absorb **PM2.5 particles** and other pollutants.
- ✦ Government policies should focus on incorporating **green planning** into city designs and incentivizing **private sector participation** in developing public parks and green belts.

💡 **Strict Regulation of Crop Residue Burning with Technological Support:** To curb the widespread practice of **crop residue burning**, India should

provide **targeted subsidies** for modern farming equipment like **stubble management machines** (e.g., **Happy Seeder**) and **biomass gasifiers** that help farmers efficiently manage crop residue without burning.

- ✦ At the same time, **enabling rural communities, especially women's self-help groups, to produce biochar from agricultural waste** can promote cleaner fuel alternatives and enhance soil health by sequestering carbon.

💡 **Strengthening Public Awareness and Community Engagement Initiatives:** Effective pollution control requires **active public participation** and a culture of environmental responsibility.

- ✦ India should expand **public awareness campaigns** focused on the **health risks of air pollution** and the **role individuals play** in reducing emissions, especially in the **residential sector**.
- ✦ Community-driven initiatives to promote **clean cooking fuels**, **green transport alternatives**, and **waste reduction** can be incentivized through rewards or recognition programs.

### Conclusion:

To address India's air pollution crisis, the country must adopt a comprehensive approach that **integrates cleaner technologies, stricter enforcement, and public awareness, aligning with the SDGs of Good Health and Well-being (SDG 3), Sustainable Cities and Communities (SDG 11), and Climate Action (SDG 13)**. The balance between **3Ps—Profit, Planet, and People—must guide India's air quality management strategies** to ensure economic growth, environmental sustainability, and improved public health for all.

## Unleashing India's Entrepreneurial Spirit

*This editorial is based on "**Transforming a Nation of Job Seekers**," published in The Indian Financial Express on 26/07/2025. The article presents a compelling case for complementing India's skilling efforts with a strong push*

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*for mass entrepreneurship. It aligns with the vision of the Draft National Skill Policy 2025 and argues that to truly realise the goal of Viksit Bharat.*

**Tag:** GS Paper - 2, Human Resource, Skill Development, Education, GS Paper - 3, Employment, Mobilization of Resources, Inclusive Growth

India's **demographic dividend** with nearly 65% of its population under 35 presents a powerful opportunity for economic growth. But to truly harness this potential, **India must go beyond job creation and focus on fostering a culture of mass entrepreneurship.** The **Draft National Skill Policy 2025** lays a strong foundation for large-scale skilling, but without complementary efforts to enable local enterprise, the demographic advantage may remain untapped.

### What is the Present State of India's Entrepreneurship Ecosystem?

- 💡 **Rapid Expansion of the Startup Base:** **India's startup ecosystem** is now the **world's 3<sup>rd</sup> largest**, with over 1.57 lakh **Department for Promotion of Industry and Internal Trade (DPIIT)** recognised startups as of December 2024, up from just 502 in 2016.
- 💡 **Rise of Tier II and III Cities as Beacons of Growth:** While major hubs like Bengaluru, Hyderabad, Mumbai, and Delhi NCR have been at the forefront of India's Entrepreneurial transformation, **smaller cities are increasingly contributing to the momentum with over 51% of the startups emerging from Tier II/ III cities.**
  - ✦ Through initiatives like Startup India, the government has played a pivotal role in nurturing this growth and empowering the next generation of entrepreneurs.
- 💡 **Fintech Driving Entrepreneurial Momentum:** Fintech is leading India's Entrepreneurial Ecosystem with **India ranking 2<sup>nd</sup> in global fintech adoption** (~87% usage), with rapid growth in digital payments, lending, and insurtech.
  - ✦ The fintech sector in India is projected to reach a valuation of \$420 billion by 2029, with a compound annual growth rate (CAGR) of **31%**.

💡 **AI-Led Innovation Surge:** Entrepreneurship in India is **increasingly driven by AI in India with over 70% of startups** are integrating artificial intelligence into their operations by mid-2025, especially in healthcare, edtech, and retail.

- ✦ As per the BCG-NASSCOM Report 2024, **India's AI market is projected to grow at a CAGR of 25-35%**, reinforcing its potential for innovation and job creation.
- ✦ While AI automates routine tasks, it is simultaneously generating new opportunities in **data science, machine learning, and AI-driven applications.**
- 💡 **Policy-Driven Entrepreneurial Reform:** India's entrepreneurship boom is no longer centralized states like Uttar Pradesh, Assam, and Gujarat are launching targeted startup and innovation policies with dedicated venture funds, incubation networks, and single-window clearances.
  - ✦ For instance, **Delhi's Draft Industrial Policy (2025-35)** includes a ₹400 crore startup Venture Capital (VC) fund and industry-academia tech parks. These sub-national ecosystems are localizing innovation and **giving rise to "startup-ready" governance.**
- 💡 **Entrepreneurship Beyond Tech- Agripreneurs & Artisans on the Rise:** India's entrepreneurial spirit is expanding beyond tech to include agripreneurs, artisans, and **self-help groups (SHGs).**
  - ✦ Platforms like **DeHaat, KisanKonnnect, and Loop** are digitizing agri-supply chains for smallholder farmers.
- 💡 **Rise of the Solopreneur & Creator Economy:** India's gig and creator economy is booming, with more individuals monetizing content, expertise, and services via platforms like **YouTube and Instagram.**
  - ✦ **As of 2025, India boasts over 2 to 2.5 million** active digital creators, many operating without traditional teams or VC funding. From fitness coaches to vernacular educators and AI content designers, a new generation of individual entrepreneurs is **reshaping the definition of "business."**

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## What are the Key Impediments to the Growth of India's Entrepreneurship Ecosystem?

- 💡 **Inadequate Job Creation:** The number of job seekers far exceeds the formal employment opportunities available.
  - ✦ **Without promoting entrepreneurship alongside job creation**, India's large youth population could become a burden instead of a benefit.
  - ✦ Draft National Skill Policy 2025 states that 110 million students, 220 million **Not in Employment, Education, or Training (NEETs)**, and 20 million unemployed persons are seeking or set to seek employment, highlighting the scale of India's job market challenge.
  - ✦ According to the **McKinsey Report (2020)**, India needs to create 90 million non-farm jobs by 2030 to absorb the 60 million new workers expected to enter the workforce based on current demographic trends.
- 💡 **Uneven Access to Capital:** A large section of aspiring entrepreneurs, especially women, people with disabilities, and those from marginalised backgrounds, find it difficult to access loans or investment, owing to a **lack of collateral, digital access, or formal credit history**.
  - ✦ The **NITI Aayog report** shows that in FY 2021–22, **around 79% of Mudra accounts** held by women were in the Shishu category, while only 10–11% were Kishore, and a mere 4% Tarun, reflecting limited access to larger loans.
  - ✦ As of July 2024, the **Stand Up India scheme** has facilitated over 2.35 lakh loans to SC/ST and Women entrepreneurs across the country. **Still, many borrowers continue to face disproportionate barriers** due to the lack of collateral or bank-level biases.
- 💡 **Inadequate Infrastructure and Digital Divide:** **NSSO (National Sample Survey Office) data (2024)** reveals a staggering disparity stating that only **24% of rural households have internet access**, compared to 66% in cities.
  - ✦ Also, despite growing **UPI penetration** and platforms like **Jan Dhan-Aadhaar-Mobile (JAM) trinity** and Digital Saksharta Abhiyan

(DISHA), many first-time entrepreneurs especially women and marginalised communities continue to face barriers in accessing formal credit, digital tools, and market linkages **due to lack of awareness, inadequate documentation, or poor connectivity**.

- 💡 **Limited Reach of Entrepreneurial Support Systems:** While urban **start-ups** enjoy infrastructure, mentorship, and funding access, rural and small-town entrepreneurs often lack the necessary **networks, awareness, and ecosystem support**.

- ✦ As per the **World Economic Forum (WEF) (2024)**, in the last 10 years, over 120,000 startups have been registered in India, making it the **3<sup>rd</sup> largest startup ecosystem in the world**.

✍ Yet, that concentration still leaves many rural districts without meaningful access to incubation, mentorship or capital.

- 💡 **Low Female Labour Participation:** Though the **Female Labour Force Participation Rate (LFPR)** improved to 31.7% in 2023–24, only 15.9% of working women are in salaried jobs, with the rest mostly in low-productivity, self-employed roles.

- ✦ Without targeted skilling and entrepreneurship support for women, gender gaps will persist.
- ✦ In addition to limited job access, women entrepreneurs **face barriers like the glass ceiling**, limiting upward mobility, and the **glass cliff**, placing them in high-risk leadership roles with a higher risk of failure.

- 💡 **Shallow Innovation Pipeline and Patent Commercialization Gap:** India ranks high in patent filings globally, but many of these patents remain unutilised due to weak industry-academia linkages and poor commercialisation infrastructure.

- ✦ This in turn discourages **potential entrepreneurs who lack access to incubators, legal support**, and technology transfer mechanisms needed to translate innovations into viable businesses.
- ✦ India has seen a 24.6% increase but the number of patents actually reported as **"working"** dropped dramatically from 16,181 in 2019–20 to just 560 in 2022–23.

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As per the [Economic Survey 2024-25](#), despite a 17-fold rise in patent grants since 2014–15 and improved innovation rankings (India ranked 39 in GII 2024), most patents remain unutilised due to weak industry-academia linkages and poor tech transfer infrastructure.

💡 **Lax Implementation of Existing Entrepreneurship Initiatives:** Despite initiatives like the **Skill India Mission** and **Atal Innovation Mission (AIM)**, their impact has been limited due to uneven implementation and **lack of a coordinated, district-level institutional framework**.

- ✦ With **limited penetration in rural and aspirational districts**, these schemes fall short in ensuring outreach, scalability, and inclusivity.
- ✦ Despite training 13.7 million candidates under the [Pradhan Mantri Kaushal Vikas Yojana \(PMKVY\)](#) under Skill India, **only 18% (approximately 2.4 million) have been successfully placed in jobs**, highlighting a significant gap between skilling and employment outcomes.

💡 **Societal Preference for Secure Jobs:** The traditional Indian aspiration is still largely focused on securing government or salaried jobs.

- ✦ **Entrepreneurship is not yet culturally embedded as a desirable career choice**, particularly in rural areas.
- ✦ Most youth and their families still aspire for stable government jobs or salaried employment, especially in rural areas. This **cultural hesitation limits the pool of willing entrepreneurs** despite policy incentives.

#### What are the Key Government Initiatives Supporting the Entrepreneurship Ecosystem?

- 💡 [Startup India Initiative](#)
- 💡 [Startup India Seed Fund Scheme \(SISFS\)](#)
- 💡 [Atal Innovation Mission \(AIM\)](#)
- 💡 [Fund of Funds for Startups \(FFS\) Scheme](#)
- 💡 [Bharat Startup Knowledge Access Registry \(BHASKAR\)](#)

- 💡 [Mentorship, Advisory, Assistance, Resilience and Growth \(MAARG\) Portal](#)
- 💡 [SAMRIDH Scheme](#)

### What Reforms are Needed to build a Robust Entrepreneurship Ecosystem Across India?

💡 **Institutionalising Entrepreneurship Through a National Mission:** To systematically support job creation and promote local enterprise, a **National Entrepreneurship Mission** can be established as an umbrella mission for initiatives like Skill India and Atal Innovation Mission.

- ✦ This mission should have an operational presence in every district, linking it with the Aspirational [District Programme \(ADP\)](#).
- ✦ For example, the **Global Alliance for Mass Entrepreneurship (GAME)**, in partnership with NITI Aayog, is piloting vibrant entrepreneurship ecosystems in Nagpur, Visakhapatnam, and selected districts of Uttar Pradesh.

💡 **Shifting Focus from Start-up India to 'Entrepreneurship for Bharat':** India's entrepreneurial growth must emerge from small towns, remote districts, and villages.

- ✦ These areas need targeted support in terms of digital infrastructure, financial services, and inclusion in platforms like the [Open Network for Digital Commerce \(ONDC\)](#) and [UPI](#).
  - 💡 The aim is to reduce migration to overburdened cities and build resilient, self-sustaining local economies.
- ✦ India's Shark Tank model can be expanded into a **"Shark Roots" initiative** to highlight rural and grassroots innovations.
  - 💡 By extending entrepreneurial storytelling and funding platforms beyond metro cities, it can unlock untapped talent, promote inclusive growth, and foster a truly bottom-up startup ecosystem.
- ✦ India can also draw inspiration from global models such as **Indonesia's Desa Brilian initiative**— focuses on nurturing

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entrepreneurship at the village level, and **Chile's Start-Up Chile program**, which supports regional and social entrepreneurship beyond urban tech hubs.

💡 **Enabling Underserved Groups Through Targeted Skilling and Support:** Special provisions are necessary for individuals at the **bottom of the pyramid, such as persons with disabilities**.

✦ Their training must extend beyond vocational skills to include financial literacy, pricing strategies, and market behavior.

✦ There's a need for a dedicated **"remote buddy or mentor system"**, especially in remote regions.

💡 AI-enabled skill development platforms, integrated with tools like **BHASHINI**, can act as a **crucial bridge offering multilingual, accessible training content** and personalized guidance at scale.

💡 **Promote Gender-Focused Skilling and Entrepreneurship:** Expand schemes like Mahila Samman Savings Certificate, **Pradhan Mantri Kaushal Vikas Yojana (PMKVY)**, and Skill India Mission with women-specific modules in digital literacy, marketing, and enterprise management.

✦ Strengthen the Start-up India for Women and **Women Entrepreneurship Platform (WEP)** to support early-stage women-led ventures through seed funding, mentoring, and networking.

✦ Entrepreneurs like **Kiran Mazumdar-Shaw (Biocon)** and **Falguni Nayar (Nykaa)** can be showcased as role models.

💡 Their stories can inspire women and boost entrepreneurship, with coordinated efforts enhancing their impact.

💡 **Mandatory Entrepreneurship Curriculum in Higher Education:** Entrepreneurial mindsets must be nurtured systematically by integrating a structured entrepreneurship curriculum in colleges and universities.

✦ This includes **practical modules on idea validation, financial literacy** and digital enterprise management.

💡 Beyond formal education, **campaigns should promote entrepreneurship as a respectable and viable career path** especially in non-metro regions shifting the current cultural preference for salaried and government jobs.

✦ Initiatives like **Jagriti Yatra (15-day long national train journey of aspiring/current entrepreneurs)** can be customized by the government for entrepreneurs with **limited financial means to maintain inclusivity**.

💡 **Exit and Re-entry Reforms:** To foster a risk-tolerant entrepreneurial ecosystem, India must simplify exit processes for failed startups and **allow seamless re-entry for entrepreneurs**.

✦ Reforms in insolvency laws, **faster resolution mechanisms**, and removing stigma around business failure will encourage more individuals to innovate without fear of long-term penal consequences.

💡 **Procurement Reform for Startups:** The government can mandate that a fixed percentage of public procurement especially in sectors like health, education, and rural development be sourced from registered startups.

✦ Such **preferential procurement policies would empower entrepreneurial spirit**, provide reliable market access, and boost confidence among early-stage ventures, particularly those led by women, youth, and marginalized groups.

## Conclusion

To truly realise the **vision of Viksit Bharat**, India must move beyond skilling and job creation to building a culture of **mass entrepreneurship**. By empowering youth at the bottom of the pyramid and **shifting focus from Start-up India to Entrepreneurship for Bharat**, the country can transform its demographic dividend into inclusive and resilient economic growth. After all, unleashing **'Entrepreneurial Jan Andolan'** is the next big leap for India's growth story.

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## India-China Water Tensions- The Brahmaputra Factor

This editorial is based on "[China's Construction of a Dam on the Brahmaputra: A Call for Stronger Action](#)," published in The Indian Express on 29/07/2025. The article discusses the significant concerns arising from China's hydropower project on the Yarlung Tsangpo River (Brahmaputra) and emphasizes the need for India to adopt a more assertive approach in addressing the risks posed by the project.

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

China's decision to build a massive hydropower project on the Yarlung Tsangpo River (**Brahmaputra** in Tibet) in Medog County, just 30 km from the Indian border, raises significant concerns for India. The project amplifies fears of hydro-hegemony, with potential implications for **downstream flow regulation**, increased **flood vulnerability (water bombs)**, and long-term ecological degradation. Given the Brahmaputra's significance for India's water security and **Northeast's livelihoods**, such unilateral developments pose risks to regional stability and transboundary river governance norms.



### What is the Significance of the Brahmaputra River for India?

- 💡 **Water Security and Agriculture:** The Brahmaputra is a lifeline for India, particularly for its **northeastern states like Assam, Arunachal Pradesh and Meghalaya**. The river is essential for irrigation, drinking water, and industrial use in these states.
  - ✦ For instance, **Assam's tea industry**, one of the largest in the world, thrives due to the favorable conditions created by the river.
  - ✦ These **regions rely on the river's seasonal flooding for crops**, making it crucial for **India's food security**. Any disruption in water flow could severely impact agricultural production.

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- 💡 **Hydropower Generation:** India is focusing on hydropower projects on the Brahmaputra, particularly in Arunachal Pradesh, which has significant potential for large-scale energy generation.
  - ✦ **Major hydropower projects in the Brahmaputra basin include** Lower Subansiri, **Dibang**, Kameng, and Ranganadi in Arunachal Pradesh.
    - 📌 The **Subansiri Hydroelectric Project** alone will generate 2,000 MW of electricity, supporting India's growing energy needs.
- 💡 **Ecological and Biodiversity Significance:** Brahmaputra river valleys are **home to important national parks and wildlife sanctuaries** (e.g., Kaziranga, Manas).
  - ✦ The Brahmaputra valley and nearby low hills mostly have deciduous forests.
  - ✦ **Majuli, the world's largest river island**, is located in the Brahmaputra in Assam.
  - ✦ The Brahmaputra's **dynamic flow creates** a mosaic of wetlands, **oxbow lakes**, and grasslands that are essential for migratory birds and aquatic species, including the **endangered Gangetic river dolphin**.
- 💡 **Strategic Importance:** The Brahmaputra River, **being a transboundary river**, holds strategic importance for both India and China.
  - ✦ This geographic positioning elevates the river's importance in the broader geopolitical rivalry between the two nations.
    - 📌 The **strategic significance of the Brahmaputra is thus not just environmental but a powerful lever in shaping India-China relations**, influencing military, diplomatic, and regional security policies.
  - ✦ The impact of climate change on the **Tibetan Plateau**, **the source of the Brahmaputra**, introduces an additional dimension of strategic friction in India-China relations.



- 💡 **Transportation and Connectivity:** The Brahmaputra serves as a key waterway for northeastern India, facilitating trade and commerce, especially in the remote areas of Assam and Arunachal Pradesh.
  - ✦ It **provides an alternative to road transport**, reducing congestion and fostering regional connectivity.
  - ✦ The government has also been **developing the National Waterway 2**, which connects the Brahmaputra from Dhubri to Sadiya, enhancing **India's inland water transport infrastructure**.

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**Note:** The agreement between India and China on sharing **hydrological data for the Brahmaputra River** expired in June, 2023.

- 💡 Although an **Expert Level Mechanism (ELM)** has existed since 2006, no joint projects have materialized under cooperative agreements, and a formal bilateral treaty remains absent.
- 💡 Neither country is a party to the **UN Convention on the Law of Non-Navigational Uses of International Watercourses**. However, while India adheres to customary principles such as equitable use and no significant harm as demonstrated by the **Indus Waters Treaty**, China has shown less commitment to these norms.

### What are the Potential Impacts of China's Hydropower Project on India?

- 💡 **Environmental Risks and Disruption of Ecosystems:** It threatens to alter the natural flow of the Brahmaputra. The contribution of glacier melt, snowmelt, and precipitation in Tibet to the waters of the Siang River is already **estimated to range between 25% and 35%**.
  - ✦ Additionally, the construction of cascade reservoirs could **disrupt aquatic ecosystems and fisheries** in the Brahmaputra River basin, which provides livelihoods to millions in Assam and Arunachal Pradesh.
    - 📌 Alterations in water flow and sedimentation downstream are likely to harm the ecosystem, despite claims of the project being a **"run-of-the-river" initiative**.
  - ✦ For instance, China's development of a cascade of smaller hydropower projects on the Mekong has **affected Myanmar, Thailand, Laos, Cambodia and Vietnam**.
    - 📌 Also, the **2000 Siang flood in Arunachal** was caused by an upstream landslide breach in Tibet, highlighting the vulnerability of the region.
- 💡 **Geological and Seismic Risks:** China's project is being built in **Seismic Zone V** (very high risk).

- ✦ The construction of reservoirs and tunnels in this fragile, seismically active region raises concerns over **earthquake-induced flooding**.
  - 📌 The **Medog Fault and the Himalayan Frontal Thrust** present significant geological challenges that could lead to **disasters if the construction is not meticulously managed**.
- ✦ Previous lapses in Chinese construction quality (e.g., in the **Neelum-Jhelum project in Pakistan-Occupied Kashmir**) leave little room for error in the engineering process.
- 💡 **Economic Impacts on India's Hydro-Energy Sector:** Competition for water resources between the two countries will **reduce India's ability to harness hydroelectric power** from the river, forcing it to rely more on alternative energy sources for its future energy needs.
  - ✦ In response to China's Medog Dam project, India is considering the development of the **Upper Siang Hydroelectric Project** in **Arunachal Pradesh**, which aims to generate 11,000 MW.
  - ✦ This growing competition over dam-building risks **trigger a hydrological arms race, potentially threatening regional stability**.
    - 📌 Also, this **project faces local opposition**, highlighting the complex balance between energy needs, environmental concerns, and community interests.
- 💡 **Displacement and Internal Security Threat:** The dam has the potential to significantly alter floodplains and riverine ecosystems, **risking large-scale displacement across Assam, Arunachal Pradesh**, and even downstream regions in Bangladesh.
  - ✦ Over **40% of Majuli Island's landmass has already eroded**, further degradation of the region is likely to intensify displacement and exacerbate socio-economic vulnerabilities.
  - ✦ Also, **flooding in Bangladesh could trigger cross-border migration** into India, placing pressure on border regions and potentially giving rise to internal security challenges.

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✦ Alongside, prolonged water shortages or increased flooding could **trigger internal unrest in the northeastern states** of India.

💡 **Potential Halt to Diplomatic Revival and Confidence-Building Efforts:** Aggressive hydropower expansion undermines recent attempts at reviving bilateral trust and people-to-people contact.

✦ Projects near disputed territories **send negative signals during a fragile diplomatic thaw.**

✦ Recently, **India and China resumed talks on reviving the Kailash Mansarovar Yatra.** Such initiatives may stall if water disputes further strain public and political trust.

### What Measures Can India Adopt to Safeguard Its Interests in the Brahmaputra Basin?

💡 **Strengthening the Joint Rivers Commission (JRC):** The JRC, which currently facilitates discussions on river issues between India and Bangladesh, could be expanded to include China, **ensuring that all riparian countries are consulted** regarding significant infrastructure developments such as dams.

✦ **India-Bangladesh's Ganges Water Agreement** provides an example of how intergovernmental cooperation can be institutionalized for sharing water resources.

💡 Expanding such frameworks to include China could mitigate risks associated with unilateral actions.

✦ India **can explore models similar to the Indus Water Treaty** to foster a cooperative framework with China for the Brahmaputra Basin.

💡 **Enhance Domestic Preparedness to Mitigate Risks:** India must invest in advanced hydrological studies and monitoring systems along the Brahmaputra, ensuring it can better assess water flow, sediment patterns, and environmental impact downstream.

✦ This can be facilitated through technologies like **satellite surveillance, remote sensing, and real-time monitoring.**

✦ The **Tehri Dam on the Bhagirathi River** in Uttarakhand effectively manages flood control

and water supply, providing a model for similar infrastructure on the Brahmaputra.

💡 Also, the **National Water Development Authority** has proposed **two links to connect the Brahmaputra and its tributaries to the Ganga basin**, enabling the transfer of surplus water to regions facing water scarcity.

💡 **Strategic River Infrastructure as Deterrence (Non-Coercive Signalling):** India can selectively prioritize and complete downstream infrastructure such as barrages and reservoirs to demonstrate first-use riparian rights and strategic preparedness.

✦ These projects **need not be provocative but serve as credible signalling in response** to unilateral upstream actions.

✦ This strengthens **India's negotiating position without direct confrontation.**

✦ Such projects in Upper Siang and Dibang Valley can be part of **India's strategy to create "hydro-strategic leverage."**

💡 **Deepening Technical Cooperation with Downstream Neighbours:** India can work with Bangladesh, Bhutan, and even Nepal on joint flood modeling, seasonal hydrological prediction, and emergency coordination protocols.

✦ A **unified lower riparian bloc can add collective diplomatic weight** and foster South Asian hydro-solidarity. It also supports regional climate resilience goals.

💡 **Engage with Environmental NGOs:** Partnering with **NGOs** that focus on transboundary rivers could help amplify India's concerns. These organizations can play an advocacy role in pushing for sustainable water management practices in international forums.

✦ Organizations like **International Rivers and Wetland International** have successfully lobbied for responsible dam construction and basin-wide ecological planning.

✦ By aligning with such groups, **India can strengthen its voice against ecologically damaging projects** and promote a rules-based river governance model.

💡 **Building Long-Term Water Resilience:** Alongside strategic and diplomatic measures, India must

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invest in diversifying its water sources to **reduce over-dependence on transboundary rivers like the Brahmaputra**.

- ✦ Alternative water sources like **rainwater harvesting**, desalination, and underground water storage **contribute to a multi-source water security approach**, enhancing national resilience against external hydrological shocks.
- ✦ **Developing efficient irrigation systems in the northeastern states** will help mitigate the impact of water shortages.
  - 📌 **Israel's water conservation techniques and desalination plants** can serve as models for India to explore alternative solutions, especially in water-scarce regions.

## Conclusion

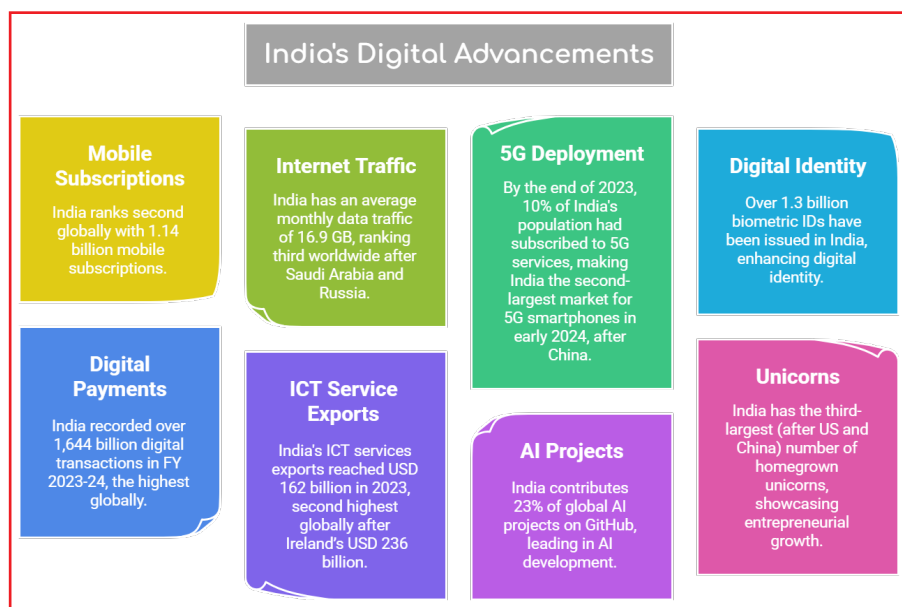
India's response to China's Brahmaputra projects must **combine strategic preparedness, ecological prudence, and cooperative diplomacy**. Strengthening infrastructure, adopting advanced technologies, and fostering regional partnerships will enhance water security and resilience. Grounding its approach in **equity, intergenerational justice, and no significant harm**, and aligning with global frameworks like **SDG 6, the UN Watercourses Convention, and the Sendai Framework**, India can transform this hydrological challenge into an opportunity for **regional stability, environmental stewardship, and sustainable growth**.

## Bridging the Digital Divide for Inclusive Growth

*This editorial is based on "Bridging the Digital Chasm," published in Financial Express on 27/07/2025. It highlights the need to address digital literacy gaps in India's digital economy, highlighting the need for improved financial literacy, better digital infrastructure, and stronger regulations to ensure inclusive growth.*

**Tag:** GS Paper - 3, Inclusive Growth, GS Paper - 2, Government Policies & Interventions, E-Governance

As India **strides towards its goal of becoming a developed nation by 2047**, the rapid growth of its **digital economy** has emerged as a cornerstone of its transformation. **From fintech innovations to digital governance**, its transformation is being powered by technology. Flagship initiatives such as **Digital India, the Jan Dhan-Aadhaar-Mobile (JAM) trinity, and the UPI** have **expanded digital access** to unprecedented levels. While this digital revolution has paved the way for significant progress, it also presents a critical challenge: **who is being left behind?**



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## What are the Key Factors

### Driving India's Digital Economy?

#### 💡 Digital Payments Growth & Financial Inclusion:

The rapid rise of digital payments in India is not just a technological shift but a **powerful driver of financial inclusion, especially in underserved regions.**

- ✦ In 2024 alone, UPI processed about 172 billion transactions, up 46% from 117.64 billion in 2023 (National Payments Corporation of India).
- ✦ This is a **testament to both infrastructure expansion and behavioural change**, with more people turning to digital platforms for everyday transactions.
- ✦ **RBI report** notes that nearly a **third of digital payment users now come from rural India**, and merchant adoption is rising in smaller towns and villages.
- ✦ As of January 2025, a total of 54.58 crore Jan Dhan accounts have been opened, out of which 30.37 crore accounts (**55.7%**) are held by women.

#### 💡 Smartphone & Internet Penetration: Affordable smartphones and inexpensive data have made India a **mobile-first economy**, expanding access to online education, digital payments, and entertainment.

- ✦ According to the State of India's Digital Economy Report 2024, **India ranks as the third-largest digitalized country globally** in terms of economy-wide digitalization.
  - 📎 The country has a massive internet user base of over 900 million and **ranks 39<sup>th</sup> in the Global Innovation Index 2024.**
- ✦ The **'Internet in India Report 2024'** reveals that active internet users reached 886 million in 2024, reflecting an 8% YoY growth.

#### 💡 Adoption of AI and Cloud Technology: Companies are increasingly integrating **AI and cloud technology** to enhance productivity, improve customer

experiences, and develop new services. This digital transformation is driving growth in both the cloud market and the overall digital economy.

- ✦ As per the India AI 2023 Expert Group Report, **AI is expected to contribute USD 967 billion to India's GDP by 2035.** With 16% of global AI talent in India, second only to the US, the country is well-positioned to leverage AI for innovation and digital growth.
- ✦ In 2020-23, India's cloud market accounted for 1.1-1.2% of the global market. The market is projected to grow at a 24% **compound annual growth rate (CAGR)** from 2024 to 2027, reaching USD 20.3 billion by 2027.
  - 📎 The **cloud market is among the fast-growing segments** of India's digital economy, which is expected to drive a fifth of the national GDP by 2030 (MeitY).

#### 💡 Global Capability Centres (GCCs) and Startup Expansion: India has emerged as a global leader in GCCs, with **55% of the world's GCCs** based in the country as of 2022.

- ✦ GCCs offer services such as R&D, IT support, and business process management to multinational corporations, significantly contributing to India's digital economy.
  - 📎 These centres cater **to North America, Europe, and Asia**, providing round-the-clock operations.
- ✦ India's focus on scalable digital infrastructure like **UPI and India Stack** has helped startups and SMEs streamline operations and attract investors.
  - 📎 Digital platforms, particularly **e-commerce** and digital marketing, are now essential for business success.
- ✦ India's exports of ICT services reached USD 162 billion in 2023, making it the **second-largest exporter globally**, after Ireland. This strong export performance highlights the growing importance of India's digital services on the global stage.

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- ✍ The **GI Cloud (MeghRaj)** initiative aims to provide ICT services via Cloud to all Government Departments at the Centre and States/UTs, promoting the Cloud ecosystem nationwide.
- 💡 **Digitalisation of Traditional Sectors:** India's digital economy is projected to grow twice as fast as the overall economy, contributing to one-fifth of national income by 2029-30.
  - ✦ In the Banking, Financial Services, and Insurance (BFSI) sector, **over 95% of banking payment transactions are digital.**
  - ✦ In the retail sector, while most companies are **opting for an omnichannel mode**, an interesting reverse trend is being seen. E-tailers and e-sellers such as **Nykaa, Urban Ladder, and FirstCry**, which began as completely online models, have, over time, invested in physical stores.
    - ✍ Retailers are incorporating technologies such as **Augmented Reality (AR)**, Virtual Reality (VR), and AI to enhance the shopping experience.
    - ✍ For instance, **virtual trials of accessories, skin analyzers** and predictive demand planning are being utilized to personalize services and optimize inventory management.
  - ✦ Other traditional sectors that are now **steadily transitioning to digital include education, hospitality, and logistics.**
- 💡 **E-Governance Initiatives-Services at Fingertips:** The Indian government has been at the forefront of integrating digital technologies for efficient service delivery.
  - ✦ Initiatives like **DigiLocker, MyGov, and e-District** provide citizens with easy access to essential services and documents at their fingertips.
  - ✦ These efforts significantly contribute to **improving governance, reducing bureaucratic hurdles, and promoting digital inclusion.**



### What are the Barriers to India's Inclusive Digital Transformation?

- 💡 **Digital Literacy Gaps and Exclusion:** Rapid digital adoption has outpaced digital literacy, especially for women and rural populations. Only **24% of the population is financially literate**, with even lower rates among women and informal workers (National Centre for Financial Education - NCFE).
  - ✦ The **informal sector, contributing 45% to India's GDP**, faces digital exclusion despite initiatives like **e-Shram** and **PM-SVANidhi**.
    - ✍ This disparity further widens the wealth gap, **creating multi-layered digital inequality** that deepens socioeconomic divides.
- 💡 **Barriers to Digital Adoption in Micro and Small Enterprises:** A significant number of micro and small enterprises still face barriers to fully embracing digital tools.
  - ✦ While **69% use digital wallets**, less than half have access to digital credit or e-commerce platforms.
  - ✦ A Centre for Effective Action study found **58% of merchants hadn't adopted digital payments despite low barriers.**
  - ✦ Barriers such as economic limitations, lack of trust in technology, and fear of fraud hinder broader adoption.

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- ✎ This reflects a psychological and institutional gap, preventing these enterprises from scaling and reaching their full potential in the digital economy.
- 💡 **Vulnerability to Cyber Fraud:** A lack of understanding of online security and consumer rights leaves low-income and informal workers vulnerable to cyber fraud.
  - ✦ As per the Central Payment Fraud Information Registry, in FY24, **13.42 lakh UPI fraud cases amounting to ₹1,087 crore were reported**, a drastic increase from the previous year.
  - ✎ As per the National Cybercrime Reporting Portal (NCRP), **digital arrest** scams and cybercrimes in India nearly **tripled between 2022 and 2024**.
  - ✦ This growing vulnerability underscores the need for stronger **cybersecurity** awareness and consumer protection to ensure **digital tools do not become instruments of exploitation** for those least equipped to protect themselves.
- 💡 **Unregulated Digital Lending Platforms:** The rise of unregulated digital lending platforms is another significant challenge. These platforms **target users with minimal financial exposure**, offering loans at exploitative interest rates.
  - ✦ **Despite the Reserve Bank of India (Digital Lending) Directions, 2025**, unregulated digital lending platforms continue to operate outside the purview of regulators, **contributing to debt traps for vulnerable populations** and exacerbating financial instability.
  - ✦ A report by MeitY highlighted that over **1,000 unregulated lending apps operate in the country**, targeting low-income groups with limited access to formal credit.
- 💡 **Infrastructure Challenges in Digital Transformation:** India's digital infrastructure faces significant challenges, including slow broadband speeds, **uneven 5G rollout**, and **insufficient fiber-optic networks**.
  - ✦ Even though Indian internet speeds have increased, they are **still yet to close the gap on**

many of the high-income countries—both in infrastructure-related challenges as well as India's overall digital divide.

- ✎ As per the Speedtest Global Index, **India ranks 25<sup>th</sup> globally for mobile internet speeds** as of November 2024.
- ✦ Moreover, India's fiberization rate stands at 44%, significantly **behind the target of 70%**.
- 💡 **Regulatory Bottleneck and Vacuum:** India faces significant regulatory bottlenecks and a lack of comprehensive frameworks in emerging sectors.
  - ✦ For instance, the **Digital Personal Data Protection (DPDP) Act, 2023** remains largely unimplemented, with key rules yet to be enforced.
  - ✦ Additionally, there is a notable absence of adequate regulations for **cryptocurrency**, AI-generated content, and other evolving technologies, leaving gaps in consumer protection, data privacy, and accountability.
  - ✎ This regulatory vacuum creates uncertainty and hinders the growth of these sectors, **impeding India's ability to fully capitalize on digital innovations**.

### What Measures Can Be Implemented to Strengthen India's Digital Landscape?

- 💡 **Promoting Financial Literacy:** Financial literacy should be prioritised alongside basic infrastructure like roads and electricity. India can implement **nationwide financial literacy programs** targeting women, youth, and informal workers.
  - ✦ The National Centre for Financial Education (NCFE) can collaborate with **self-help groups**, **anganwadi workers**, and panchayats to deliver financial education at the grassroots level.
  - ✦ **Expand initiatives like PMGDISHA** to improve digital literacy in rural areas and include financial literacy modules in existing programs.
- 💡 **Inclusive Digital Infrastructure:** To overcome digital exclusion, affordable smartphones and low-bandwidth applications are essential. India **needs to ensure digital services are accessible even in remote areas**.

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- ✦ The **BharatNet Project**, aimed at connecting rural India with high-speed internet, could be expanded further to ensure that internet connectivity is more accessible for all.
- ✦ Integrating **mesh networks, low-Earth satellites, and 5G Fixed Wireless Access** can further reduce infrastructure gaps. Internet access must be treated as a **basic utility, not a privilege**.
- 💡 **Strengthening Fintech Regulation and Consumer Protection:** Fintech regulation should be tightened, with a focus on faster grievance redress and enforcing RBI guidelines to protect users from fraud and exploitative lending.
- ✦ The **RBI's Digital Lending Guidelines, introduced in May 2025**, are a step in the right direction, but stricter enforcement and regular audits of digital lenders are necessary to protect vulnerable users.
- 💡 **Promote Responsible AI Integration in Governance:** With India pushing for AI in public service delivery (e.g., **BHASHINI, ONDC**), there is a need to ensure ethical, explainable, and inclusive AI deployment.
- ✦ Public sector algorithms must undergo **periodic bias audits**, and government departments should develop AI-readiness frameworks.
- ✦ **Encouraging indigenous AI innovation** through open datasets, sandbox environments, and public-private R&D collaboration will create context-aware solutions.
- 💡 **Data Privacy and Cyber-Security Awareness:** Cybersecurity must become a core pillar of digital development, not just a reactive strategy. Every tier of government should have a cyber hygiene protocol, with capacity-building for local officials and frontline workers.
- ✦ Public digital infrastructure **must have cyber-resilience layers** by design, with audits, backups, and risk simulations. India should scale its **Cyber Swachhta Kendra** model to rural networks and Small and Medium Businesses (SMBs).
- ✍ Moreover, effective implementation of the **Digital Personal Data Protection Act, 2023**, is crucial for safeguarding citizens' data.
- ✦ The **EU's General Data Protection Regulation (GDPR)** sets a global benchmark for data privacy regulations. India could strengthen its data privacy laws by adopting similar frameworks.
- 💡 **Fostering Innovation through Startups and Incubators:** Promote digital startups by providing subsidies for R&D, tax benefits, and incubation support.
- ✦ **India should expand startup incubators** and accelerators for digital businesses in rural areas to ensure inclusive innovation.
- ✍ Initiatives like **Atal Innovation Mission (AIM)** and **Startup India** should include specific programs to support digital startups **focusing on rural development** and informal sector digital tools.
- 💡 **Institutionalise Digital Governance Standards across Ministries:** The digital maturity of ministries and departments varies widely.
- ✦ A central **Digital Governance Standards Authority (DGSA)** should define benchmarks for user experience, data governance, grievance redress, and service uptime.
- ✦ **Ministries should undergo annual digital audits** and receive rankings to foster healthy competition. Integration of services under a unified citizen dashboard can prevent duplication and improve accountability.
- 💡 **Regulate Platform Economy to Ensure Fair Digital Markets:** With the dominance of digital platforms across sectors (e-commerce, **gig work**, fintech), India needs an updated digital competition framework.
- ✦ **Laws must ensure** algorithmic fairness, data portability, and grievance redress for digital consumers and workers.
- ✦ The **upcoming Digital Competition Bill** must be implemented with a focus on both market innovation and user protection. The government should also nudge platforms to adopt self-regulation codes. **A fair digital economy is critical for long-term sustainability.**

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## Conclusion

India's digital future hinges on addressing critical gaps in digital literacy, cybersecurity, and infrastructure. By focusing on inclusive policies, strengthening regulations, and improving financial literacy, India can ensure **broad-based participation** in the digital economy. The upcoming **Digital India Act** aims to provide a robust legal framework for the evolving digital landscape. The vision of "**Digital India, Inclusive India**" must center on using **technology as an enabler for all citizens**, ensuring that no one is left behind in the country's digital transformation.

## Justice Behind Bars-Reforming Custodial Norms

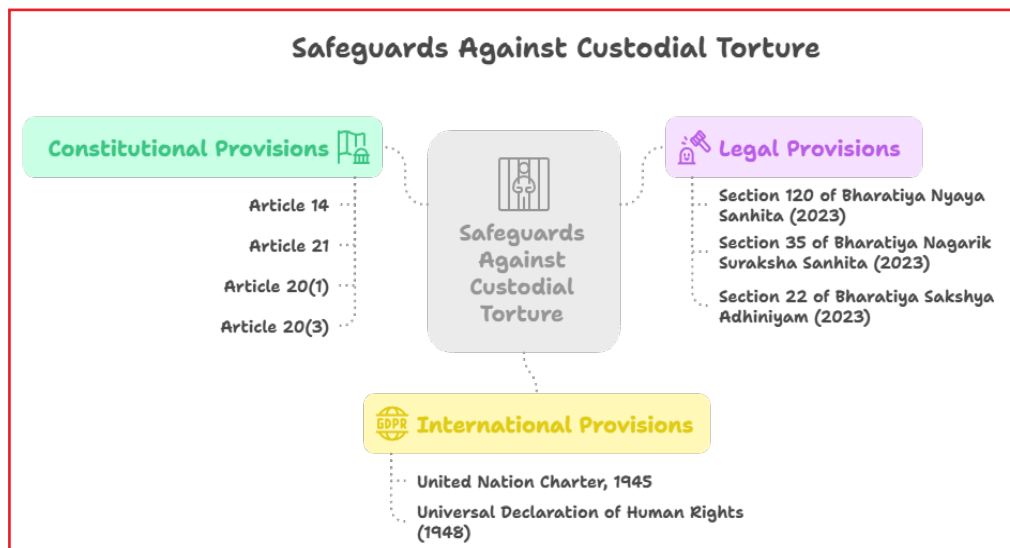
*This editorial is based on "[India's Police Must Get Out of Dirty Harry's Shadow](#)," published on 31/07/2025. It highlights the pervasive issue of custodial violence in India, calling for a shift from coercive policing to a more professional, humane approach with emphasizing the need for stricter accountability measures.*

**Tag:** GS Paper - 2, Government Policies & Intervention, Judgements & Cases, Fundamental Rights, Transparency & Accountability

The recent case of **custodial death in Tamil Nadu** underscores the troubling persistence of high-handed practices and undue force in policing across India. In such cases, torture and forced confessions often **replace methodical, evidence-based investigations**. These instances of abuses are frequently misreported as accidents or suicides, and those responsible rarely face accountability. This reflects a **deeper systemic issue of custodial harm and abuse, rooted not only in police misconduct but also in broader flaws within the criminal justice system**.

What are the Current Statistics Related to Custodial Harm and Abuse in India?

- 💡 **Magnitude and Trends:** According to the **National Human Rights Commission (NHRC)**, India witnessed over 11,650 custodial deaths **(including police and judicial custody)** between 2016 and 2022.
  - ✦ Furthermore, in 2024, NHRC reported 2,739 custodial deaths, with 155 attributed **specifically to police custody**.
  - ✦ The **Global Torture Index 2025** classified India as a **"high risk" country** for systemic torture and custodial brutality.
- 💡 **State-wise Patterns:** As per the NHRC and Lok Sabha data (2023) between 2018-19 and 2022-23, **Uttar Pradesh recorded the highest custodial deaths** after Maharashtra, West Bengal, and Tamil Nadu.



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## What are the Main Challenges Contributing to Custodial Harm and Abuse in India?

- 💡 **Use of Third-Degree Methods for Confession:** Pressure to solve cases quickly, inadequate training in forensics, and poor investigative infrastructure lead to **reliance on forced confessions**.

- ✖ This approach **disproportionately affects marginalized communities** such as daily-wage workers, migrants and SC/STs further, perpetuating structural injustice.

- 📎 The NCAT's 2019 analysis revealed that 75 (60%) of 125 deaths in police custody registered cases **belonged to the poor and marginalized communities**.

- ✖ **Torture is not just bad policing; it is structural injustice**, signifying that the roots of the issue run deeper than individual misconduct.

- 💡 **Neglect of Soft Skills and Support Systems in Policing:** While policing budgets allocate funds for equipment and surveillance, far less is spent on capacity building or psychological support for personnel.

- ✖ Policing budgets **prioritize gear and enforcement ('hardware')** over training, mental wellness, or human rights education ('software').

- 📎 The SC in the **Prakash Singh judgment (2006)** directed states to implement key reforms, including **separation of investigation from law and order but it is yet to be materialised**.

- ✖ Most officers receive limited human rights or trauma-informed policing training. Overwork, stress, and poor peer support lead to burnout, which **sometimes "metastasizes" into brutality**.

- 📎 CCTV coverage, mandated in all lock-ups and interrogation rooms by **Supreme Court directive (2015)**, is often missing, non-functional, or deliberately bypassed.

- 📎 **Digital logging of detainees' movement and custody**, and video or audio recording of interrogations, is seldom routine.

- 💡 **Overcrowding and Under-Resourced Prisons:** India's prisons are often overcrowded, leading to further stress on the system and an increase in custodial violence.

- ✖ **Over 75% of India's prison population are undertrials**, facing prolonged incarceration due to judicial delays and inadequate legal aid, **leading to overcrowding**.

- 📎 **Overcrowding exacerbates tensions** and increases the chances of ill-treatment or abuse.

- ✖ India's prisons are **operating at a national average of 131% capacity**, with the situation worsening significantly over the last decade.

- 📎 Also, the web series like **Criminal Justice (though fictional)** aptly highlights the deteriorating conditions of Indian prisons, particularly for women.

- ✖ Police stations, **especially in rural or underdeveloped areas, are poorly equipped** to handle detainees properly. This increases the likelihood of violations such as arbitrary detention or torture.

- 💡 **Absence of Legal and Institutional Reforms:** Despite legal safeguards against custodial torture, such as the **D.K. Basu (1996)** guidelines and the **K.S. Puttaswamy (2017)** judgment, the practice remains rampant.

- ✖ The **lack of a standalone anti-torture law**, the failure to ratify the **UN Convention Against Torture**, and the absence of enforceable accountability mechanisms underscore the systemic neglect of reforms in policing.

- ✖ Also, between 2016 and 2022, the NHRC recommended compensation in just 1,184 cases of custodial deaths.

- 📎 Additionally, disciplinary action was taken in only 21 cases, **accounting for a mere 0.18% of the total, and no cases** resulted in prosecution.

- ✖ The **Law Commission of India's 273<sup>rd</sup> Report (2017)** had urged the government to pass such a law (The Prevention of Torture Bill), but to

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date, there has been no legislative action, leaving the justice system ineffective in curbing custodial deaths.

- 💡 **Lack of Civil Society Participation:** Independent civilian bodies to monitor police activities are often weak or ineffective. Active civil society participation in ensuring police accountability is limited, and public awareness about **human rights** violations in custody is often low.

- ✦ While media and **NGOs** have played a role in highlighting custodial abuse, they are often unable to sustain campaigns due to limited resources, legal threats, or government interference.
- ✦ Despite the establishment of **Police Complaints Authorities (PCAs)** at the state and district levels, these bodies often lack the authority and resources to enforce accountability.

### What Reforms are Essential to Ensure Safe and Accountable Custodial Practices in India?

- 💡 **Legal and Policy Measures:** Parliament should enact a dedicated **anti-torture law that prioritizes time-bound investigations** and ensures accountability for custodial violence, as recommended by the Law Commission's 273<sup>rd</sup> Report.
- ✦ The law must mandate the **expeditious and systematic video or audio recording of all interrogations**, with independent audits and acceptance of such recordings as valid evidence in courts.
- ✦ It is also imperative that **India ratifies the United Nations Convention Against Torture (UNCAT)**, which will subject the country to global standards and scrutiny regarding its policing practices.
- ✍ Additionally, there must be a **comprehensive policy to provide prompt compensation and meaningful rehabilitation for the families of victims**, holding the government responsible for any undue delays or denials.

- 💡 **Prioritizing Police Wellness and Training:** There needs to be a strategic reallocation of police budgets, with at least **5% directed toward officer wellness**, establishing **mental health units, regular counseling, and sustained human rights training**.

- ✦ There is a need to institutionalise **mental wellness within law enforcement, not as a luxury, but as a necessity**.
- ✦ Police training curricula must mandatorily include modules on ethics, community policing, trauma-informed care, and international best practices, such as the **PEACE (Preparation and Planning, Engage and Explain, Account, Closure, and Evaluation) Model** used in advanced democracies.
- ✍ Countries such as **Norway, Canada and New Zealand have adopted it with similar success**. The European Committee for the Prevention of Torture (CPT) has endorsed it.

- 💡 **Technological and Procedural Safeguards:** All police stations and lock-ups must be equipped with **tamper-proof closed-circuit cameras monitored in real-time**, and there should be strict disciplinary action for any tampering or disabling of surveillance equipment.

- ✦ The adoption of **digital custody registers and logbooks** is essential for accurately tracking every detainee's movement through police custody.
- ✦ Integrate **real-time digital logging and geo-tagging** of every arrest, transfer, or detention into a centralized police database. Each **custodial movement must be time-stamped** and linked to officer ID, location, and medical status.

- 💡 **Forensic-Led Investigation as Norm, Not Exception:** Shift India's criminal investigation model from confession-driven to evidence-based policing by mandating forensic integration at the FIR stage.

- ✦ **Strengthen district-level forensic labs** with trained personnel, chain-of-custody mechanisms, and digital case tracking. Embed forensic protocols into police training curriculum and SOPs.

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✎ This **reduces reliance on coercive tactics** and enhances prosecutorial integrity. A scientific approach ensures objectivity and minimizes custodial abuse incentives.

💡 **Empowerment of Oversight and Complaints**

**Mechanisms:** Give state and district-level Police Complaints Authorities (PCAs) the **power of independent inquiry, suo motu investigation**, mandatory public reporting, and recommendations that are binding or at least subject to detailed review if not accepted.

✦ To reduce the undue influence or pressure on the police, the SC suggested establishing a **State Security Commission in Prakash Singh v. Union of India** to monitor the function of the state police.

💡 **Custody Impact Audit as Part of Police Performance**

**Evaluation:** Include Custodial Audit Score based on THE number of complaints, medical reporting compliance, and review of CCTV footage in annual

performance reviews of station house officers and investigative units.

✦ Link poor scores to denial of promotions, and high compliance to incentives. **Aligning career outcomes with ethical custodial conduct** builds internal accountability. Performance must reward dignity preservation.

## Conclusion

Transforming custodial practices in India is not merely a matter of legal reform but a deeper test of our commitment to human dignity and constitutional values. As India strives to strengthen its democratic institutions, it is time to acknowledge **that power without empathy, in certain instances, can be nothing more than violence** by another name. Real reform in policing is crucial, and it must be rooted in professionalism, respect for human dignity, and an unwavering commitment to justice. ***"A nation's justice system is not only judged by how it punishes the guilty, but also by how it protects the powerless."***



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## Drishti Mains Questions

1. The India-US relationship has evolved significantly over the decades, transitioning from Cold War-era tensions to a multifaceted strategic partnership. Discuss the key factors that have contributed to this transformation and analyze the current areas of cooperation and friction.
2. Assess the impact of the Digital India initiative on governance, financial inclusion, and socio-economic empowerment. In your opinion, what further measures should be implemented to address the existing challenges and ensure inclusive digital growth for all segments of society?
3. India's maritime sector holds significant potential for economic growth, regional cooperation, and global strategic influence. Analyze the key issues affecting India's maritime sector and suggest measures to enhance its global competitiveness and security.
4. Examine the strategic, ecological, and economic importance of the Indian Himalayan Region. In light of environmental challenges and development pressures, suggest sustainable policy measures for its preservation.
5. What are the risks of demographic transition in emerging economies like India, and what structural reforms are needed to holistically unlock its demographic dividend?
6. Discuss the transformation of India's healthcare system over the past decade, highlighting key regulatory reforms, infrastructural challenges, and the role of digital platforms in ensuring equitable healthcare access.
7. India's leadership in the Global South comes with the challenge of balancing its aspirations with its growing engagements with the West. Discuss the measures India can adopt to effectively manage its leadership in the Global South while maintaining strong ties with Western powers.
8. "India's disaster management framework remains largely reactive and structurally misaligned with emerging climate-linked disaster risks." In the light of this statement, critically examine the limitations of India's current disaster governance and suggest a resilient, multi-hazard risk reduction approach in line with the Sendai Framework.
9. Evaluate the key strides and challenges in India's innovation ecosystem and suggest measures to strengthen public-private collaboration for sustainable growth.
10. In light of the ongoing Mega Transshipment Port, evaluate the potential challenges related to tribal rights, biodiversity conservation, and climate change in the Andaman and Nicobar region.
11. Assess the potential of the PM E-Drive scheme to catalyze India's electric vehicle manufacturing ecosystem under the Make in India initiative.
12. Examine the role of forests in India's ecological balance and livelihoods. How can forest conservation strategies be aligned with the Sustainable Development Goals?

## Drishti Mains Questions

13. Discuss the role of Artificial Intelligence (AI) in India's energy transition, focusing on its potential to optimize renewable energy integration, enhance grid management, and reduce transmission losses. What measures can be taken to ensure a successful AI-driven energy transformation?
14. "India's relationship with Latin America has evolved significantly in the 21st century, yet numerous challenges remain in fully realizing its potential". Examine the key areas of cooperation between India and Latin America, and discuss the obstacles hindering deeper engagement.
15. Despite significant expansion and policy reforms like the NEP 2020, India's higher education system continues to grapple with issues of quality, equity, and global competitiveness. Examine the key challenges and suggest a roadmap for transforming higher education into a catalyst for national development.
16. Analyze the evolving dynamics of India-China relations in terms of conflict, competition, cooperation, and containment. How should India approach its future ties with China?
17. How can Artificial Intelligence (AI) contribute to inclusive and sustainable economic growth in India? Examine with sector-specific examples.
18. "Despite achieving food self-sufficiency and running the world's largest food distribution programme, India continues to grapple with high levels of malnutrition." In this context, examine the role of soil health and food system reforms in ensuring nutritional security.
19. Soil degradation is one of the most pressing environmental challenges facing India today. Discuss its causes, impacts on agriculture and food security, and suggest sustainable measures to mitigate its effects.
20. India-UK relations have evolved significantly over the years, transitioning from colonial legacies to a more strategic partnership. In this context, analyze the key areas of convergence and divergence between the two nations.
21. Examine the key factors and hurdles limiting India's potential to attract sustained foreign direct investment (FDI) and suggest measures for improvement.
22. Analyze the factors contributing to the persistence of Left Wing Extremism (LWE) in India. How can security and development strategies, as per the SAMADHAN doctrine, effectively address this issue?
23. Discuss the major causes of air pollution in India and evaluate the effectiveness of the National Clean Air Programme (NCAP). Suggest additional measures to improve air quality management.
24. How can India transform its demographic dividend into inclusive growth through mass entrepreneurship?
25. Examine the implications of China's hydropower project on the Brahmaputra River for India. What steps can India take to safeguard its water resources and regional stability?
26. Evaluate the challenges and measures for ensuring inclusive growth in India's rapidly growing digital economy.
27. What are the root causes behind the persistence of custodial violence in India? Suggest actionable reforms to eradicate custodial torture and ensure justice.