Is it the end of progress against extreme poverty?

What Is Extreme Poverty?

- The World Bank defines extreme poverty as living on **less than $2.15 per day** (2017 PPP).
- It is associated with severe deprivation—chronic food insecurity, absence of basic sanitation, lack of access to healthcare, electricity and schooling.
- This threshold is widely used as the standard benchmark to monitor progress towards **SDG-1 (No Poverty)**.

Relevance

GS 1 – Society

- Long-term patterns in global poverty and changes in population structure.
- Contrast between regions that reduced poverty (Asia) and those lagging (Africa).
- Linkages with social outcomes such as health, education, inequality and life chances.

GS 2 – International Relations / Social Justice

- Tracking global performance on SDG-1 (No Poverty) and SDG-10 (Reduced Inequalities).
- Role of multilateral bodies like the World Bank, IMF, UN agencies in financing and guiding anti-poverty strategies.
- Governance failures and institutional weaknesses in fragile and conflict-affected states.

GS 3 – Economy

- Relationship between economic growth and poverty reduction (growth–poverty elasticity).
- Importance of structural change, decent work and productivity increases.
- Impact of climate stress and violent conflict on economic performance and poverty levels.
- Future poverty estimates and the challenge of prolonged economic stagnation in parts of Africa.

What Has Happened Since 1990? (Global Background)

- In **1990**, around **2.3 billion** people lived in extreme poverty.
- By **2024**, their number had fallen by roughly **1.5 billion**, making it one of the most significant improvements in human well-being ever recorded.

Main drivers:

- Very rapid economic expansion in several Asian economies such as **China, Indonesia, India, Bangladesh**.
- Structural transformation: shift of workers from low-productivity agriculture to industry and services; urbanisation and industrialisation.
- Integration into global trade and value chains, enabling export-led growth.

Why the Earlier Rapid Decline Is Slowing

- In the 1990s, most of the world's poor were located in countries that were growing quickly, especially in Asia.
- Today, the bulk of the extreme poor live in **African economies** where growth has been weak or stagnant—examples include **Madagascar, DR Congo, Malawi, Mozambique, Burundi, Central African Republic**.
- In many of these countries, **GDP per capita has barely moved for decades**, meaning living standards have not improved in any meaningful way.

Projections (World Bank + IMF)

A. Up to 2030

- The number of people in extreme poverty is projected to fall only slightly—from about **831 million (2025)** to **793 million (2030)**.
- This decline is very modest compared to the sharp reductions seen in earlier decades.

B. After 2030

- A turning point is expected: the global count of the extreme poor may start **rising** again because of:
  - Persistent stagnation in several African economies.
  - High population growth (high fertility rates).
  - High exposure to climate shocks and natural hazards.
  - Weak state capacity and fragile institutions limiting effective policy action.

C. Geographic Shift

- **1990:** Majority of the extreme poor lived in Asia.
- **2024–2040:** The centre of gravity shifts to **Sub-Saharan Africa**, which is expected to host most of the world's extreme poor.

Why Progress Is Stalling

- Deep and long-term economic stagnation in key African countries (e.g., in **Madagascar**, average incomes are comparable to the 1950s).

- In several of these economies, **average income levels are below the international poverty line**—so even perfect redistribution of income could not lift everyone above it.
- Rapid population growth outstripping gains in GDP; per-capita terms show little improvement.
- Repeated climate disasters and frequent conflicts eroding physical and human capital.
- Poor health and education outcomes leading to low productivity and a weak human capital base.

How Latin American Countries Fit Into This Picture (Panama, Bolivia, Mexico, Brazil)

A. Mexico

- Classified as a **middle-income economy** with moderate poverty reduction.
- Extreme poverty fell considerably between **1990–2015**, but progress has slowed or plateaued since then.

Drivers:

- Growth linked to manufacturing and integration into North American value chains (NAFTA).
- Social assistance schemes such as **Oportunidades** improved basic welfare.

Challenges:

- Strong regional divide between relatively prosperous north/centre and poorer south.
- High levels of crime, informality and limited productivity growth since 2015.

B. Brazil

- Witnessed a large fall in extreme poverty between **2003–2014**, helped by:
  - Conditional cash transfer programmes (e.g., **Bolsa Família**).
  - Commodity boom raising fiscal space and incomes.
- In recent years, poverty reduction has slowed due to:
  - Political turbulence and policy uncertainty.
  - Stagnant productivity and growth.
  - End of the commodity super-cycle.
- Nevertheless, poverty levels remain **well below those of the worst-performing African economies**.

C. Panama

- One of the **fastest-growing** economies in Latin America; extreme poverty dropped sharply.
- Growth driven largely by services—especially **Panama Canal operations, logistics and finance**.

Key Concern:

- Very high inequality and persistent poverty in **indigenous and remote regions**, despite national-level growth.

D. Bolivia

- Experienced notable poverty reduction after **2005** due to:
  - Hydrocarbon-led growth and higher government revenues.
  - Expansion of cash transfers and social programmes.
- However, with the slowdown of the commodity boom after **2014**, growth has weakened and further poverty reduction has become harder.
- Bolivia is still doing better than stagnant African economies, but does not match **Asia's rapid, broad-based transformation**.

Overall Latin America Trend

- The region has not seen the same **deep stagnation** as parts of Africa, but growth has generally been **too modest** to replicate Asia-style poverty elimination.
- **Persistent inequality** in income, assets and opportunities undermines the pace of poverty reduction across Latin America.

Chart Logic Explained (Charts 1A–1D & Chart 2)

Charts 1A & 1B – High-Growth Asian Economies

- Countries such as **China, Indonesia, India, Bangladesh** started with very high poverty rates (often above 60%).
- Sharp rises in GDP per capita are mirrored by a dramatic fall in extreme poverty to single-digit levels.

Chart 1C – Latin America (Mexico, Brazil, Bolivia, Panama)

- Initial poverty levels lower than Asia's starting point.
- Reduction is slower because:
  - Growth is moderate rather than explosive.
  - Inequality remains high.

- Poverty is more entrenched and structural, not mass extreme poverty.

Chart 1D – African Stagnators

- Countries like **DR Congo, Malawi, Burundi, CAR, Mozambique** show almost flat GDP-per-capita lines.
- Extreme poverty rates stay stubbornly above 50% with little downward movement.

Chart 2 – Projections to 2040

- Demonstrates a break from the historical pattern:
  - Continued decline of global extreme poverty till about **2030**.
  - Thereafter, a projected **rise**, driven mainly by African trends.
- Latin America continues with relatively low extreme poverty but is not the main source of global reduction.
- Asia largely **exits extreme poverty**.
- **Sub-Saharan Africa** becomes the primary contributor to global extreme poverty figures.

Key Insight: Redistribution vs Growth

- In economies such as **Madagascar** or **DR Congo**, the **average income level is itself below the poverty threshold**.
- Even if income were perfectly equalised across the population, everyone would still be poor.
- Only **sustained, broad-based economic growth** can push average income above the poverty line and eliminate extreme poverty at scale.

Why the Future Looks Different From the Past

- Earlier global progress was powered by countries that were poor but had:
  - Capacity for rapid growth.
  - Relatively stronger states and institutions.
- Now, most of the remaining extreme poor live in settings marked by:
  - Very low administrative capacity.
  - Weak and fragile institutions.
  - High exposure to climate risks.
  - Ongoing or recurrent conflict.
  - Serious deficits in health, education and basic infrastructure.

- Without deep **structural transformation**—in agriculture, industry, governance and human capital—these economies risk getting locked into a **poverty trap**.

Implications for SDGs

- **SDG-1 (End poverty in all its forms everywhere by 2030)** is almost certain to be missed.
- **SDG-10 (Reduce inequality)** becomes increasingly important, as large cross-country and within-country gaps persist.
- Sub-Saharan Africa will have to become the **central focus of global development efforts**.

Policy Lessons

- A **growth-centred strategy** is indispensable in low-income countries; redistribution policies cannot substitute for growth.
- Priority areas for investment:
    - **Education** – to build skills and human capital.
    - **Health** – to improve productivity and resilience.
    - **Agricultural productivity** – especially smallholder-based and climate-resilient agriculture.
    - **Climate adaptation and resilience** – to limit damage from shocks.
    - **Governance and institutional reform** – to improve state capacity and rule of law.
- **Redistributive policies and social protection** become more effective once basic growth has raised average income levels.

PAN MASALA CESS & HIGHER DUTIES ON TOBACCO PRODUCTS

Why Is This in News?

- The Union Government has placed before Parliament two new bills:
    1. **Health Security Cess Bill, 2025**
    2. **Central Excise (Amendment) Bill, 2025**
- Aim:
    - To create fresh revenue sources as the **GST Compensation Cess** on tobacco is phased out.
    - To tighten fiscal and regulatory control over pan masala production.

- Background: The compensation cess introduced alongside GST will end once loans taken during the COVID period are repaid.

Relevance

GS 2 – Governance / Polity

- Issues of **fiscal federalism** and Centre–State financial relations.
- Parliamentary law-making process and tax legislation.
- Debate on cesses that are not shared with States, even in sectors (like health) where States bear primary responsibility.

GS 3 – Economy / Public Health

- **Pigouvian taxes** and use of taxation to discourage harmful consumption.
- Taxation of "sin goods" and behavioural nudges.
- Revenue strategy after the sunset of the GST compensation framework.
- Tackling illicit trade and improving compliance through technology (machine-based excise).

Basics – GST Compensation Cess (2017–Present)

- Levied on selected "sin" or luxury goods: **tobacco, aerated beverages, coal, pan masala**, etc.
- Purpose: To bridge the gap between pre- and post-GST revenue for States for an initial five-year period (2017–2022).
- The period was extended to allow repayment of loans raised during the pandemic due to lower GST collections.
- Tobacco and pan masala: highly taxed both for revenue and public health goals.

Key Features of the New Bills

A. Health Security Cess Bill, 2025

- Proposes a **fresh cess** on tobacco products.
- Intended to:
    - Replace the expiring GST compensation cess.
    - Provide dedicated funds for **health and national security-related expenditure**.
- The levy is tied to **machines used** or **processes undertaken** in the manufacture of pan masala and similar products.

B. Central Excise (Amendment) Bill, 2025

- Seeks to **increase excise duties** on tobacco items.
- Adjusts the central excise structure so that:
    - Revenue from tobacco remains robust after the compensation cess ends.
    - The tax base for sin goods remains stable and predictable.

Rationale Behind the Move

Fiscal Rationale

- As the compensation cess is wound down, there is a need to **maintain revenue flows** from high-yield sectors like tobacco.
- Tobacco is relatively **inelastic** in consumption, making it a reliable revenue source even at high tax rates.
- The pan masala industry has a high risk of **tax evasion**; levying cess based on the number and capacity of machines strengthens monitoring.

Public Health Rationale

- India suffers a huge tobacco-related disease and death burden (around **1.3 million deaths annually**).
- Pan masala and similar products, often containing **areca nut**, are strongly linked to cancer.
- Raising taxes makes these products **less affordable**, especially for young and low-income consumers.

Governance Rationale

- A machine-linked cess builds on earlier pre-GST frameworks such as the **Pan Masala Packing Machines Rules**, which used machine counts for excise purposes.
- It improves **traceability**, discourages unregistered units and curbs under-reporting.

Economic & Policy Implications

Centre–State Fiscal Dynamics

- Signals the final winding down of the **GST compensation regime**.
- States lose a shared and predictable stream of compensation cess; the new health cess is a **purely central** levy.
- This may sharpen debates on **revenue sharing** and fiscal space for States.

Impact on Industry

- Higher duties will raise the **cost of production** for:

  - Cigarettes
  - Chewing tobacco
  - Pan masala and related products
- Likely consequences:
  - Increase in retail prices.
  - Some contraction in demand.
  - Potential lobbying by industry, citing employment and smuggling concerns.

Public Health

- WHO recommends that taxes should account for at least **75% of retail price** of tobacco.
- In India, the actual tax burden is still below this threshold for several tobacco products.
- The new cess plus higher excise is a step towards aligning with **global best practices**.

GST Framework

- Marks a move from a **single compensation cess** to multiple, more **purpose-specific cesses**.
- Raises questions about:
  - Complexity in the GST system.
  - Increased compliance burden for businesses.
  - Erosion of the spirit of a unified tax regime.

Political & Parliamentary Context

- The bills were tabled amid protest and disruptions in the House on unrelated political issues.
- The **Winter Session** often sees major financial and tax legislation.
- The passage of the **Manipur GST Amendment Bill** alongside highlights an ongoing push for fine-tuning GST law.

Challenges & Criticisms

- States may oppose the shift from a shared compensation cess to a **non-shareable cess**, especially when health is largely a State responsibility.
- Higher taxes risk fuelling **illicit and smuggled tobacco**, which undermines both health objectives and revenue.

- Small pan masala units may break up production or move informally to evade machine-based excise.

Value Addition (Data + Concepts)

- India is the **second-largest consumer** of tobacco in the world.
- The economic cost (health + productivity) of tobacco use is estimated at roughly **1% of GDP**.
- The use of sin taxes is an example of **Pigouvian taxation**, where tax is used to correct negative externalities.

Why does India need bioremediation?

Why Is It in News?

- Concern is growing over rising levels of contamination from human waste, untreated sewage, industrial effluents, oil spills, pesticides and heavy metals.
- Major rivers like **Ganga and Yamuna** continue to be heavily polluted despite large-scale cleaning programmes.
- Policy and scientific communities are looking to **bioremediation** as a cost-effective, environment-friendly alternative to conventional, chemical-intensive clean-up methods.
- Discussions are underway on national standards, **biosafety guidelines** and regulation of **genetically modified (GM) microbes** to allow broader use of such technologies.
- Bioremediation is being linked to flagship initiatives such as **Swachh Bharat**, **Namami Gange** and various green technology programmes.

Relevance

GS 1 – Geography / Environment

- Soil and water degradation, polluted river systems and contaminated lands.
- Environmental hotspots connected with industrialisation and mining.

GS 2 – Governance

- Legal and regulatory gaps regarding biosafety, GM organisms and environmental release.
- Division of responsibilities between Centre and States in managing solid and liquid waste.

What Is Bioremediation?

- A process that employs **microorganisms** (bacteria, fungi, algae), plants or their enzymes to break down or neutralise pollutants.
- Converts harmful substances—such as oil, pesticides, plastics, dyes and heavy metals—into non-toxic or less toxic forms like water, carbon dioxide, salts or simpler organics.
- Microbes use pollutants as a **source of energy or nutrients**, thus cleaning the environment through their normal metabolism.

Types of Bioremediation

1. **In situ (on-site) methods**
    - Treatment occurs at the contaminated location itself.
    - Examples:
        - Spraying "oil-eating" bacteria on marine oil spills.
        - **Bioventing** and **biosparging** to inject air and nutrients into polluted soils.
2. **Ex situ (off-site) methods**
    - Contaminated soil or water is excavated or pumped out and treated elsewhere.
    - Examples:
        - **Bioreactors**, **biopiles**, **land-farming** systems.
3. **Advanced techniques**
    - Use of **GM microbes** engineered to digest particularly tough pollutants like plastics or persistent organic pollutants.
    - **Nanobioremediation**, where nanomaterials are combined with microbes to enhance clean-up efficiency.

Why Does India Need Bioremediation?

Severe Pollution Load

- Large volumes of untreated sewage and industrial effluents enter rivers, lakes and groundwater.
- Mining areas, industrial belts, and landfill sites are heavily contaminated with toxic chemicals and metals.

Limitations of Traditional Methods

- Conventional physico-chemical treatment (e.g., chemical precipitation, incineration) is:
    - Capital and energy intensive.

- Produces secondary wastes that must be managed separately.

Advantages of Bioremediation

- Typically **cheaper**, more energy-efficient and scalable for large or diffuse contamination.
- Utilises India's rich **microbial diversity** and can be tailored to local conditions.
- Well suited for long-term remediation of contaminated soils and sediments.

Health & Agricultural Concerns

- Oil spills, pesticide residues and industrial chemicals are linked to serious health risks.
- Polluted soils reduce agricultural productivity and harm rural livelihoods.
- Landfills, like those around major cities, continue to release harmful leachate and gases.

Where India Stands

Growing Research Ecosystem

- Programmes under the **Department of Biotechnology (DBT)**, such as Clean Technology initiatives, promote bioremediation R&D.
- Institutions like **NEERI** and various **IITs** are working on microbial and nanomaterial-based technologies (e.g., cotton nanocomposites for oil absorption).
- Indigenous bacterial strains have been identified that can break down dyes, pesticides, hydrocarbons, etc.

Industry Involvement

- Biotech firms have started marketing microbial consortia and formulations for waste treatment and soil remediation.

Existing Gaps

- Absence of **uniform standards** for how bioremediation should be deployed and monitored.
- Limited data on site-specific microbial behaviour; pollutants are often in complex mixtures.
- Regulatory uncertainty, especially around GM organisms in open environments.
- Shortage of trained technicians and environmental professionals.

International Experience

- **Japan**: Integrates plant–microbe systems into urban waste treatment and brownfield restoration.

- **European Union**: Supports cross-border projects for oil-spill clean-up and mining waste remediation through its research programmes.
- **China**: Embeds bioremediation in its soil pollution control strategy and uses GM bacteria for industrial wasteland restoration.

Global trend: A steady shift towards **biotechnology-based environmental restoration**, but accompanied by **strict biosafety oversight**.

Opportunities for India

- River rejuvenation (e.g., **Ganga, Yamuna, Damodar, Musi**).
- Reclaiming degraded mining lands and old landfill sites.
- Cleaning industrial clusters such as petrochemical belts, tanneries, textile hubs.
- Generating employment in environmental biotechnology, monitoring and engineering.
- Strengthening linkages between bioremediation and national missions like **Swachh Bharat** and **waste-to-wealth** initiatives.

Key Risks

- Release of **GM microbes** into open ecosystems might cause:
    - Unintended ecological imbalances.
    - Horizontal gene transfer to native species.
- If testing and oversight are weak, new environmental problems can be created.
- Public apprehension and misconceptions about the safety of microbial technologies.
- Regulatory systems and certification mechanisms are still evolving.

What India Should Do Next

- Frame **national standards and protocols** for bioremediation, including procedures for testing, certification and monitoring.
- Build **regional bioremediation hubs**, involving universities, industry and local governments, with microbial libraries suited to local pollution profiles.
- Scale up **R&D** on indigenous strains and advanced methods like nanobioremediation.
- Strengthen **biosafety regulations** for GM microbes, with clear rules for environmental release.
- Conduct **public outreach and awareness** to gain social acceptance and encourage community participation in clean-up efforts.

Can India become self-reliant in REE production?

Why Is It in News?

- The Union Cabinet has sanctioned a **₹7,280-crore scheme** to set up integrated facilities for manufacturing **Rare Earth Permanent Magnets (REPMs)** within India.
- The plan is to convert **rare earth oxides into metals, alloys and finally magnets** domestically, thereby reducing reliance on imports.
- This decision comes at a time when **China has tightened export rules** on certain rare earths and magnet products, causing disruptions in global supply chains.

Relevance

GS 1 – Geography

- Distribution of strategic minerals in India, especially **monazite-bearing sands** in states like Tamil Nadu, Kerala and Odisha.
- Resource geography and the concept of **critical minerals**.

GS 2 – International Relations

- Role of rare earths in **global geopolitics** and the US–China tech rivalry.
- Supply chain security for high-tech sectors.
- Options for India to collaborate with partners (US, EU, Japan, Australia) on critical minerals.

GS 3 – Science & Tech

- Technologies related to **metallurgy, refining, separation and magnet manufacturing**.
- Development of an indigenous **REPM ecosystem** (especially NdFeB magnets).

What Are Rare Earth Elements (REEs)?

- A group of **17 elements**: 15 lanthanides plus **Scandium and Yttrium**.
- Known for their:
    - Strong magnetic properties.
    - Heat resistance.
    - Electrical conductivity.
- Key applications:
    - Electric vehicle (EV) motors.
    - Wind turbine generators.
    - Advanced electronics and semiconductors.

  - Defence systems (missiles, radars, avionics).
  - Smartphones, data storage devices, etc.
- Although not extremely rare in the earth's crust, their extraction and processing are **technically complex, costly and environmentally sensitive**.

China's Dominance: Scale and Strategy

- Around **70% of global production** and **90% of processing** of REEs is controlled by China, despite it holding only about **30% of known reserves**.
- China has built a **fully integrated value chain** from mining to final magnet manufacturing.

Tactics used:

- Export quotas (e.g., around 2009) later challenged at the WTO.
- Export controls on key materials like graphite.
- Licensing requirements and restrictions for certain rare earths and high-end magnet products.

Impact:

- Industries that depend on rare earths—especially **EV makers, electronics and defence**—face vulnerability when China curbs exports.
- Rare earths have become a tool in the wider **US–China trade and technology conflict**.

Why India Is Prioritising REEs

- REEs are central to India's plans for:
  - **Electric mobility**, as EV motors use NdFeB magnets.
  - **Renewables**, particularly wind energy.
  - Expansion of **electronics manufacturing**.
  - Indigenisation of **defence and space** capabilities.
- Current status:
  - India imports a large proportion of its **REE magnets (over 53,000 MT in FY 2024–25)**.
  - It holds about **8% of global REE reserves**, mainly in monazite sands along the coast.
  - But its share in global REE production is less than **1%**, and magnet manufacturing is negligible.

Government Moves Towards Self-Reliance

New ₹7,280-crore REPM Scheme

- Aims to support creation of **integrated REPM facilities** that handle everything from oxide processing to finished magnets.
- Designed to build India's **first complete domestic magnet supply chain**, particularly for NdFeB magnets.

National Critical Mineral Mission (2024–2031)

- Total allocation of **₹34,300 crore**, with an initial tranche approved earlier.
- Focuses on:
    - Exploration and mapping of critical mineral deposits.
    - Setting up refining and processing capacities.
    - Promoting recycling from end-of-life products (urban mining).

Mining Reforms

- Since August 2023, the private sector is allowed into previously restricted mining domains.
- Auctioning of REE-rich blocks is underway to attract investment and technology.

Structural Challenges for India

- Lack of robust **refining and separation** infrastructure, which is the critical bottleneck and China's main strength.
- Shortage of skilled manpower in **metallurgy, materials science and precision magnet manufacturing**.
- Environmental regulations and clearances can be slow, given the ecological risks of mining and processing.
- Long time frame—often **5–8 years or more**—needed to develop the full chain from mine to market.

Opportunities India Can Leverage

- Rich **monazite deposits** containing Neodymium and other rare earths essential for magnets.
- Growing ecosystem for **recycling rare earths from e-waste and end-of-life products**.
- Global demand for diversification away from single-supplier dependence creates space for India as a **reliable alternative**.
- Potential to:

- Lower import dependence in EVs, defence and electronics.
- Position India as an important player in **critical minerals alliances**.

Strategic Significance

Economic

- Reduces the import bill for magnets and raw REEs.
- Strengthens the **Make in India** and manufacturing push across EVs, electronics, defence and renewable energy.
- Moves India higher up the value chain, as magnets are significantly more valuable than raw oxides.

Geopolitical

- Mitigates the risk of **resource weaponisation** by any single supplier.
- Enhances India's bargaining power and role in international coalitions on critical minerals.

Security

- Modern defence platforms—from guided missiles to advanced radars—depend heavily on REPMs.
- Strategic autonomy improves if supply risks are reduced.

Environmental

- Domestic production must be accompanied by **robust safeguards** for mining and refining.
- Recycling and circular approaches can reduce both environmental damage and import reliance.

Conclusion

- Rare earths are foundational to modern high-tech industries, and China currently dominates their supply and processing.
- India possesses meaningful reserves but is still at a nascent stage in extraction, refining and magnet manufacturing.
- The new **₹7,280-crore scheme**, combined with the **National Critical Mineral Mission**, is a serious attempt to build **self-reliance**.
- The outcome will ultimately depend on **regulatory reform, infrastructure, skilled human resources and strategic global partnerships**.

Sanchar Saathi app must be pre-installed on phones: DoT

Why Is It in News?

- The **Department of Telecommunications (DoT)** has directed all smartphone makers to **pre-install the Sanchar Saathi app** on phones sold in India from **March 2026** onwards.
- The directive also requires that the app **cannot be disabled or restricted** by users.
- The step is linked to rising concerns over **IMEI tampering, SIM misuse, cross-border cyber frauds and illegal second-hand phone markets**.

Relevance

GS 2 – Governance

- Legal authority and regulatory role of DoT in the telecom ecosystem.
- Issues of mandatory apps, digital governance and consumer rights.
- Balancing concerns of **privacy, data protection and state security**.

GS 3 – Internal Security / Cybersecurity

- Threats arising from **IMEI manipulation**, SIM fraud and digital impersonation.
- Integration with **CEIR (Central Equipment Identity Register)** for tracking devices.
- Strengthening the security architecture of India's telecom networks.

What Is Sanchar Saathi?

- Originated as a portal in 2023 and was later expanded into a mobile app.
- Uses the **Central Equipment Identity Register (CEIR)** to provide:
    - Information on mobile connections issued in an individual's name.
    - Facilities to report **fraudulent or suspicious calls**.
    - Tools to detect and report **IMEI tampering**.
    - Services to **block, trace and remotely disable** stolen or lost devices.
    - Measures to prevent stolen phones from being re-activated with new SIMs.

What Has the Government Ordered Now?

- Every new smartphone sold after the cutoff date must come with **Sanchar Saathi pre-loaded**.
- Manufacturers must ensure users cannot:
    - Remove the app.
    - Disable its core functionalities.

Primary objectives:

- Verify that device IMEIs are genuine and unique.
- Minimise fraud in the second-hand mobile market and resale of stolen devices.
- Support the crackdown on large-scale digital fraud and online scams.

Why This Mandate? Rising Telecom Security Threats

IMEI Tampering

- Single IMEIs being illegally cloned across multiple devices.
- Makes it hard for law enforcement to identify, track or block specific handsets.

Cross-Border Digital Fraud

- Criminals use Indian mobile numbers while operating from outside the country.
- Enables scams involving **impersonation of officials, digital arrest threats, UPI and banking fraud**.

Second-Hand Smartphone Market

- India has a huge market for used phones.
- Stolen and blacklisted devices often enter resale channels; buyers unknowingly purchase “hot” phones.

Rising Cybercrime

- Crores of requests have been made on Sanchar Saathi for connection checks and fraud reporting.
- Tens of thousands of lost phones are reported and recovered, highlighting both demand for and utility of such a system.

Technical Layer: IMEI Authentication Push

- The goal is to ensure that the **IMEI broadcast by a device matches the registered IMEI** on the network.
- Integration of Sanchar Saathi with CEIR allows:
    - Detection of **cloned or spoofed IMEIs**.
    - Automatic blocking of such devices.
    - Permanent blacklisting of reported stolen phones.

What About Privacy Concerns?

- DoT maintains that the app is designed to **limit data collection**, focusing mainly on device and SIM details necessary for security functions.

- However, from a citizen's standpoint:
    - An app that is mandatory and non-removable can be perceived as a potential tool for **surveillance**.
    - Questions remain about the level of access it will have to device information by default.
- Past episodes (such as disputes over mandatory installation of other regulatory apps) show that **tech companies are wary** of apps that require deep access to SMS, call logs or system data.

Industry Reaction & Global Context

- Smartphone manufacturers, including global giants, typically oppose **government-mandated "bloatware"**.
- Similar tussles have occurred in India and abroad over required regulatory apps.
- The 2026 mandate may trigger:
    - Negotiations around permissions and implementation details.
    - Technical adjustments by operating system providers (Android, iOS).
    - Public debate on digital rights and state powers.

Governance & Regulatory Perspective

- DoT's justification: SIM and device identity must be tightly bound to the legitimate user to:
    - Reduce anonymous and fraudulent SIM usage.
    - Prevent telecom networks from being exploited for large-scale scams.
- Vision: A **unified framework** where device (IMEI), SIM, user identity and operator network are integrated to help combat cyber fraud.

Expected Benefits

- Easier recovery of stolen or lost devices.
- Strong disincentive for buying or selling stolen smartphones.
- Reduction in **OTP theft, UPI fraud, impersonation scams** and related cybercrime.
- Greater transparency in the second-hand mobile market.
- Improved trust in the digital ecosystem and telecom infrastructure.

Challenges Ahead

- Potential resistance from device manufacturers who fear user backlash and extra compliance costs.
- Privacy activists may challenge the mandate in terms of **proportionality and necessity**.
- The app must be user-friendly; otherwise it risks non-use or misperceptions.
- Strong safeguards will be needed to ensure that Sanchar Saathi does not evolve into a **broad surveillance tool**.

Overall Significance

- The move is part of India's broader strategy to secure its **telecom and digital infrastructure** against fraud and cybercrime.
- Connects with larger initiatives such as CEIR, Digital India and proposed national cybersecurity strategies.
- Illustrates the increasing reliance on **device-level regulation** to enforce security and trust in the digital space.

Rising GPS Spoofing Incidents Near Indian Airports

Why Is It in News?

- A series of incidents involving **GPS spoofing and GNSS interference** have been reported in the vicinity of major Indian airports.
- Delhi's airport has seen repeated episodes, with similar complaints from **Kolkata, Amritsar, Mumbai, Hyderabad, Bengaluru and Chennai**.
- The **Ministry of Civil Aviation** has informed Parliament that the **Wireless Monitoring Organisation (WMO)** is probing the sources of these signals.
- Due to safety concerns, aviation authorities like **DGCA and AAI** have directed operators to report all such events.

Relevance

GS 1 – Geography

- Understanding **GNSS systems** (GPS, GLONASS, Galileo, BeiDou).
- Vulnerabilities of satellite-based navigation in congested airspace.

GS 2 – Governance / IR

- Regulatory responsibilities of DGCA and AAI in aviation safety.
- Possibility of cross-border or geopolitical implications of interference.

GS 3 – Internal Security / Cybersecurity

- Electronic warfare tactics such as **jamming and spoofing**.
- Aviation cyber risks and the protection of critical infrastructure like airports and airspace.

What Is GPS Spoofing?

- GPS spoofing occurs when **fake GPS signals** are transmitted that overpower genuine satellite signals.
- Aircraft or other GNSS receivers may lock on to these counterfeit signals, leading to **incorrect data** on:
    - Position
    - Altitude
    - Speed
    - Heading
- This is particularly dangerous during **approach and landing**, where precise navigation is crucial.

What Is GNSS Interference?

- GNSS refers collectively to positioning systems such as GPS, GLONASS, Galileo and BeiDou.
- Interference includes:
    - **Jamming** – blocking or weakening the signal.
    - **Spoofing** – feeding false positional information.
- Both forms erode the reliability of satellite navigation, especially in **low-visibility or high-traffic situations**.

What's Happening in India?

- At Delhi's IGI Airport, several aircraft have reported **erratic GPS readings** near specific runways.
- Similar interference patterns have been noted at other major airports.
- A particularly high cluster of events was observed around Delhi in certain months, raising alarm over systematic interference.

Why Is This Dangerous?

Direct Safety Risks

- Aircraft may be misled about their exact location or altitude, causing:
    - Deviations from the assigned flight path.
    - Confusion regarding runway alignment.
    - Potential near-miss incidents or runway excursions.

Indirect Risks

- Added stress and workload for pilots and air traffic controllers.
- Space for malicious actors to exploit weakened navigation systems, especially during **political or military tensions**.
- Potential vulnerabilities in overall airspace management and **situational awareness**.

Government & Regulatory Response

- **DGCA** has mandated that all instances of suspected spoofing or interference be reported.
- **AAI** is working with airlines and ATC units to track and document occurrences.
- The **WMO** is examining signal profiles, directions and timings to identify likely sources.
- Airlines have been directed to follow established procedures and rely on **alternate navigation aids** when GPS data appears unreliable.

Possible Sources of Spoofing (Expert Views)

- Illegally operated or misused **radio-frequency jammers**.
- Interference spilling over from **cross-border electronic activity**.
- Organised criminal networks using spoofers to evade monitoring.
- Malicious cyber actors targeting aviation infrastructure.
- Poorly configured commercial GNSS repeaters or test devices.

(No official attribution has yet been publicly confirmed.)

Global Context

- Similar GNSS interference has been noted in:
    - Conflict zones in the **Middle East**.
    - The **Russia–Ukraine** theatre.
    - Certain maritime routes in **East and South-East Asia**.

- **ICAO** has highlighted the emergence of **"GNSS-denied" or degraded environments** as a significant risk for civil aviation, especially in sensitive geopolitical regions.

Why India Is Particularly Exposed

- High density of flights and busy airspace around major metropolitan hubs.
- Heavy reliance on **GNSS-based procedures** (like RNP and GLS) for approaches at several airports.
- Presence of multiple potential sources of electronic interference in the wider region.
- Easy availability of low-cost GNSS jammers and illegal RF devices.

Technical & Security Measures Needed

- Setting up a network of **GNSS interference detection and monitoring stations** around airports.
- Using technologies such as **RAIM**, satellite-based augmentation (SBAS) and **inertial navigation systems** as back-up.
- Integrating radar, ADS-B and multilateration to cross-check aircraft positions.
- Tightening controls on the sale, import and use of **RF jammers and spoofers**.
- Upgrading cybersecurity protocols for aviation infrastructure, ATC systems and onboard avionics.

Rare Earth Permanent Magnets (REPMs)

Why Is It in News?

- The Union Cabinet has cleared a **₹7,280-crore policy initiative** to boost domestic production of **Rare Earth Permanent Magnets (REPMs)**.
- The aim is to establish integrated facilities capable of transforming **rare earth oxides into metals, alloys and final magnets** within India.
- This move responds to:
    - Continued **Chinese dominance** of the REE and magnet supply chain.
    - Periodic export controls by China.
    - Rapidly growing global demand from sectors like EVs, wind power, electronics, robotics and defence.

Relevance

GS 3 – Economy & Infrastructure

- Development of strategic industries and critical mineral supply chains.
- Import substitution and industrial policy.

GS 3 – Science & Technology

- Advanced materials, **high-performance magnets** and related technologies.
- Application of metallurgy and material sciences.

GS 2 – International Relations

- Efforts to build **resilient, diversified supply chains** away from single-country dominance.
- India's position in **Quad and other critical mineral partnerships**.

What Are Rare Earth Elements (REEs)?

- A block of **17 elements** known for:
  - Strong magnetic characteristics.
  - High melting points.
  - Good electrical and thermal conductivity.
- **REPMs**—especially **Neodymium-Iron-Boron (NdFeB)** magnets—are indispensable in:
  - EV motors.
  - Wind turbine generators.
  - Consumer electronics.
  - Precision defence systems.
  - Robotics, drones and many high-efficiency motors.

Why Does India Need REPM Manufacturing Now?

Massive Import Dependence

- Despite having around **8% of global rare earth reserves**, India imports nearly all of its REPM requirements.
- Imports of magnets have crossed tens of thousands of tonnes annually, with **China supplying the overwhelming majority**.

Rising Domestic Demand

- Demand for magnets is surging due to:
  - Expanded **renewable energy** targets.
  - Rapid growth in the **EV ecosystem**.

  - Defence production and indigenisation programmes.
  - Electronics manufacturing promoted through PLI schemes.
- Consumption is expected to **double by 2030**.

Strategic Vulnerability

- With China dominating:
  - 70% of production.
  - 90% of processing and magnet fabrication.
- Export restrictions or price shocks can severely impact India's industrial and strategic plans.

What Does the ₹7,280-crore REPM Scheme Provide?

Key Features

- Targets creation of capacity to produce around **6,000 tonnes of REPMs annually**.
- A limited number of firms will receive support through **competitive selection**.
- Offers substantial **capital subsidies** to encourage fully integrated plants, covering stages from oxides to finished magnets.

Intended Outcomes

- Reduce India's dependence on imported magnets, particularly from a single country.
- Ensure reliable supply for domestic EV, defence, renewable and electronics industries.
- Upgrade the domestic **metallurgical and materials research ecosystem**.

India's Current Position

Strengths

- Significant **monazite reserves** in coastal states rich in Neodymium and other rare earths.
- Public-sector capabilities through entities like **IREL** in producing some oxides.
- Emerging private efforts in **magnet recycling** from e-waste.

Weaknesses

- Virtually no large-scale **magnet manufacturing facilities**.
- Minimal refining, metallisation and alloying infrastructure.
- High entry barrier in terms of plant cost, technology and patents.
- Difficulty in competing with **Chinese subsidised, low-cost producers**.

The China Factor

How China Built Its Edge

- Long-term state support to mining, refining and manufacturing industries.
- Vertical integration of the entire chain, enabling low costs and control over supply.
- Tight grip on technologies and intellectual property, especially in **heavy rare earths**.

Use of Leverage

- Export restrictions imposed at times of diplomatic or trade tension.
- Rare earths used as a **strategic tool** in negotiations with major economies.

How India Plans to Bridge the Gap

Domestic Initiatives

- **National Critical Mineral Mission** to support exploration, mapping and development of critical minerals.
- Reforms in mining policies to attract private investment into REE mining and processing.
- Promotion of **urban mining and recycling** to recover rare earths from discarded electronics.
- International partnerships on critical minerals with like-minded countries.

Key Requirements

- Building refining and metallisation capacities at scale.
- Incentivising private sector participation and joint ventures with technology-rich partners.
- Expansion and modernisation of IREL and similar public sector entities.
- Ensuring an integrated supply chain within India that reduces foreign dependence at every stage.

Challenges Ahead

- Competing with China's scale and pricing remains a major hurdle.
- Mining and processing raise serious **environmental and social concerns**, requiring strong regulation.
- Advanced magnet making demands high-end **R&D, skilled manpower and IP creation**.
- Long lead times for bringing mines and plants into full operation.

Why Pollution Affects North Indian Cities More Than South & West

Why Is It in News?

- A **Climate Trends (2025)** analysis of 15 major Indian cities over a decade (2015–2025) found that:
    - None of the cities achieved "good" air quality on an annual average basis.
    - **Delhi** remained the most polluted city throughout.
    - A clear **regional pattern** emerged: northern cities perform worst, while southern and western cities fare comparatively better, though not completely clean.

Relevance

GS 1 – Urbanisation

- Urban growth, population density and the urban environment.
- Urban heat island effects and air quality.

GS 2 – Governance

- Effectiveness of air quality management frameworks.
- Coordination problems among NCR and northern states.

GS 3 – Environment

- Long-term AQI trends, particulate matter levels and pollution hotspots.
- Interaction between climate factors and local pollution.
- Role of geography and meteorology in air pollution patterns.

What Is AQI & Why It Matters?

- **Air Quality Index (AQI)** rates air quality on a 0–500 scale:
    - 0–50: Good
    - 51–100: Satisfactory
    - 101–200: Moderate
    - 201–300: Poor
    - 301–400: Very Poor
    - 401–500: Severe
- The study relies on **annual mean AQI**, which is more useful for evaluating persistent air quality issues than short-term spikes.

Overall Air Quality Performance

- Delhi's average AQI peaked around **2016**, with slight improvements after 2019, but still stays in the "poor" or "very poor" bands.
- Other cities like **Lucknow, Varanasi, Ahmedabad and Pune** have also experienced extended periods of unhealthy air.
- In **2025 so far**, Delhi's AQI remains well above truly safe levels, indicating chronic pollution.

North Indian Cities Perform the Worst

- Cities such as **Delhi, Lucknow, Varanasi, Kanpur, Noida and Ghaziabad**:
    - Consistently record high levels of **PM2.5**.
    - Show recurring deterioration between **October and February** because of winter conditions.
    - Do not reach the "good" or even "satisfactory" category on an annual basis.

South & West Indian Cities Perform Better

- Cities like **Chennai, Bengaluru, Mumbai, Visakhapatnam**:
    - Have lower annual mean AQI values (often in the 120–140 zone).
    - Show some improvement trends after 2019.
    - Still, they do **not** fully meet WHO or Indian clean-air standards every year.
- Some urban centres (Chandigarh, Visakhapatnam, Mumbai) show a reduction in the number of days with very poor air, dropping from several hundred to much fewer.

Why North Is More Polluted: Geographic & Climatic Factors

1. **Indo-Gangetic Plain Topography**
    - Large, flat river basin with heavy population and industrial concentration.
    - Bounded by the **Himalayas**, which block the northward movement of air masses.
    - Acts like a **basin** where pollutants accumulate and remain trapped.
2. **Winter Temperature Inversion**
    - During winter, cold air near the surface gets capped by a warmer layer above.
    - This temperature inversion prevents vertical mixing, so emissions build up near the ground.

- Leads to dense **smog** and long-lasting pollution episodes.

3. **High Dust and Biomass Burning**
    - Dust from soil, construction and unpaved surfaces.
    - Extensive burning of **crop residues** (especially paddy stubble) in Punjab-Haryana-UP region.
    - Numerous brick kilns and industrial clusters add to particulate emissions.
4. **Low Wind Speeds**
    - Winters in northern India are marked by **slow, stagnant winds**, unlike coastal regions where sea breezes provide regular flushing of the air.

Why South & West Perform Better

- Coastal cities such as **Chennai and Mumbai** benefit from:
    - Regular **sea breezes** that disperse pollutants.
    - Higher humidity reducing dust levels.
    - Fewer strong temperature inversions that trap pollution.
- Crop patterns and farming practices in southern and western states do not involve widespread residue burning similar to the north.
- Overall dust load and biomass combustion are relatively lower, though vehicle emissions and industry still pose challenges.

Structural Factors Adding to North's Problem

- Very high **population density** and built-up area create an "urban canyon" effect, restricting air circulation.
- Larger fleet of vehicles and congestion.
- Concentration of polluting industries and construction activity.
- Significant formation of **secondary aerosols** in winter from gases like SO_2 and NOx.

03rd December 2025: Daily MCQs

Q1. Consider the following statements regarding global extreme poverty trends:

1. The majority of the world's extreme poor today live in fast-growing Asian economies.
2. Sub-Saharan Africa is projected to host most of the world's extreme poor by 2040.
3. Extreme poverty is expected to decline steadily till 2040 due to global economic convergence.

Which of the statements given above is/are correct?

A. 1 only
B. 2 only
C. 1 and 3 only
D. 2 and 3 only

Answer: B

Explanation:

- Statement 1 is incorrect → today most extremely poor populations live in stagnating African economies, not Asia.
- Statement 2 is correct → Africa is expected to dominate global poverty numbers in future.
- Statement 3 is incorrect → projections show decline till 2030, but *rise after 2030*, not steady decline.

Q2. With reference to bioremediation, consider the following statements:

1. It relies solely on genetically modified microorganisms for environmental cleanup.
2. In-situ methods such as bioventing and biosparging are used directly on contaminated sites.
3. Bioremediation is generally more energy-efficient and scalable than traditional physico-chemical cleanup methods.

Which of the statements given above is/are correct?

A. 1 and 2 only
B. 2 and 3 only
C. 3 only
D. 1, 2 and 3

Answer: B

Explanation:

- Statement 1 is incorrect → bioremediation uses natural microbes, plants, enzymes; GM microbes are only advanced variants.
- Statement 2 is correct → bioventing and biosparging are classic in-situ methods.
- Statement 3 is correct → bioremediation is cheaper, scalable, and energy-efficient.

Q3. Consider the following:

1. Rare earth oxides
2. Rare earth metals
3. Rare earth alloys

4. Rare earth permanent magnets

Which of the following correctly represents the order of production stages in integrated REPM manufacturing?

A. 4 → 3 → 2 → 1
B. 1 → 2 → 3 → 4
C. 2 → 1 → 3 → 4
D. 1 → 3 → 2 → 4

Answer: B

Explanation:
Integrated REPM chain is:
Oxides → **Metals** → **Alloys** → **Magnets**.

Q4. Consider the following pairs:

Region/City Feature	Reason for Relative Air Quality
1. Indo-Gangetic Plain	Frequent sea-breeze circulation disperses pollutants
2. Chennai–Mumbai corridor	Less temperature inversion and coastal airflow
3. Delhi–Lucknow–Kanpur belt	Winter inversion and Himalayan barrier effect

Which of the above pairs is/are correctly matched?

A. 1 and 2 only
B. 2 and 3 only
C. 3 only
D. 1, 2 and 3

Answer: B

Explanation:

- Pair 1 is incorrect → IGP has *no* sea breeze; instead pollution gets trapped.
- Pair 2 is correct → coastal cities have sea breeze and fewer inversions.
- Pair 3 is correct → winter inversion + Himalayas → severe smog.

Q5. The Sanchar Saathi initiative aims to address which of the following issues?

1. IMEI cloning
2. SIM misuse and anonymous connections
3. Tracking and blocking stolen phones
4. Monitoring mobile tower radiation levels

Select the correct answer using the code below:

A. 1, 2 and 3 only
B. 2 and 4 only
C. 1 and 3 only
D. 1, 2, 3 and 4

Answer: A

Explanation:

- The platform handles IMEI verification, SIM misuse, fraud prevention, and blocking of stolen devices.
- It does *not* monitor tower radiation levels → Statement 4 is incorrect.

Mains: **Mandatory pre-installation of digital regulatory apps like Sanchar Saathi raises important governance, privacy and cybersecurity concerns.** Critically examine the policy rationale and potential risks associated with device-level regulatory interventions. 10 Marks.