RICE IAS

Expected
EDITORIAL
EXPLAINED

for

IAS Mains Examination

23rd to 28th Feb 2026

INDEX

***

Scan to know more about our courses...

IAS 2-Year GS PCM

IAS 10-Month GS PCM

Degree + IAS

Prelims Test Series

GENERAL STUDIES 2

1.1. POLITY & GOVERNANCE

1.1.1. PARLIAMENT'S HISTORIC LAW: AN EXTENDED WAIT FOR WOMEN

Context:

- The **Constitution (One Hundred and Sixth Amendment) Act, 2023**, popularly known as the **Nari Shakti Vandan Adhiniyam (Women's Reservation Act)**, was enacted in September 2023 to reserve **one-third (33%)** of all seats for women in the **Lok Sabha**, **State Legislative Assemblies**, and the **Legislative Assembly of the National Capital Territory of Delhi**.

- While celebrated as a milestone for gender justice, the **Nari Shakti Vandan Adhiniyam** Act delays effective representation until at least **2034**, turning a constitutional promise into a deferred reality.

Key Features of the Women's Reservation Act, 2023

- **Reservation for Women:** The Act mandates the reservation of approximately **one-third (33%)** of all seats for women in the **Lok Sabha**, **State Legislative Assemblies**, and the **Legislative Assembly of the National Capital Territory of Delhi**. This quota specifically includes a sub-reservation within the seats already set aside for **Scheduled Castes (SCs)** and **Scheduled Tribes (STs)**.

- **Commencement of Reservation:** The implementation is contingent upon the publication of the **first Census** conducted after the Act's commencement. Following this publication, a **delimitation exercise** will be performed to identify the specific seats reserved for women. The provision is initially set for a duration of **15 years**, though it may be extended beyond this period by a law enacted by Parliament.

- **Rotation of Seats:** To ensure varied geographic representation, seats reserved for women will be **rotated** across different constituencies. This rotation is scheduled to occur after each subsequent **delimitation exercise**, as regulated by parliamentary legislation.

Constitutional Mechanism Responsible for the Delay: Delimitation

- **What is Delimitation**: It is the process of redrawing boundaries of territorial constituencies to ensure that each seat represents a roughly equal number of people, reflecting population shifts over time.

- **Two Sequential Preconditions**: Reservation commences only after a **national Census** (slated for **2027**) and **Delimitation Commission** constitution by the President under **Article 82**. Census under data verification and publication require **12-18 months** historically - pushes the timeline toward 2029.

- **Delimitation Complexity**: The Commission balances **population parity**, **geographic compactness**, **administrative boundaries**, **SC/ST quotas**, and **women's seats** across **543 Lok Sabha** and **4,000+ Assembly** constituencies.
- Prior commissions (1952, 1963, 1973, 2002) took **3-6 years**; the upcoming one, involving **post-1976 seat reallocation**, may extend to **2032-33**.

Rationale Behind the Design: Accommodation Through Expansion

The decision to tie reservation to delimitation is rooted in a strategic "political arithmetic":

- **Avoiding Male Displacement:** Implementing a **33% quota** within the current 543 seats would immediately displace **181 male incumbents**.
- **The "Bigger Pie" Strategy:** Delimitation after 2026 is expected to increase the total Lok Sabha seats (potentially to **800 or even 888**). By expanding the total number of seats, political parties can accommodate 33% women without reducing the absolute number of seats currently held by men.
- **Cost of Consensus:** While this approach minimizes political friction, it results in a **"representation tax"** where women must wait an additional decade for their guaranteed rights.

Current Representation Landscape

- **Women's electoral participation has grown**—from **3% contestants** (1957) to **10%** (2024)—yet victories stagnate:
  - **14% Lok Sabha** (75/543 in 18th), **9% State Assemblies** (e.g., 21% Chhattisgarh, 0% Nagaland), **17% Rajya Sabha** (42/245).
  - Globally, average stands at 26%; India trails G20 peer.

Historical Background: A Long and Interrupted Journey

The struggle for women's representation in India has spanned nearly three decades:

- **1987 (Margaret Alva Committee):** First recommended 33% reservation for women in local bodies, leading to the **73rd and 74th Constitutional Amendments**.
- **1996 (Geeta Mukherjee Committee):** Examined the **first version** of the Bill in Parliament; however, the Bill lapsed multiple times due to lack of consensus.
- **2010:** The Bill successfully passed the **Rajya Sabha** but was never brought to a vote in the Lok Sabha.
- **2023:** The Act finally passed both Houses, yet the wait continues due to the aforementioned clauses.

Does having more women in power actually change anything on ground?

- Scholars talk about the **'Critical Mass' theory**. Research shows that when women cross a 30% threshold in a legislature, the country's **Human Development Index (HDI)** actively improves.
- **Why?** - **Because women prioritize different things**. A famous **UN Women study on Indian Panchayats** showed that local councils led by women **built 62% more drinking water projects** than those led by men. They invest in health, schools, and social safety nets. That is true **inclusive growth. Thus, women legislators foster ideal of inclusive growth.**

Critical Challenges and Structural Hurdles to Women's Representation

Despite the historic nature of the Women's Reservation Act, 2023, several systemic, design, and federal challenges persist that may impede the substantive empowerment of women in Indian politics.

I.   The Five Pillars of Female Exclusion

Despite the law, significant hurdles remain for women entering the legislative space:

- **The Patriarchal Mindset:** Deep-seated social norms view women as homemakers. This is evidenced by the **"Sarpanch Pati"** phenomenon in PRIs, where elected women serve as proxies for their husbands.

- **The "Winnability" Trap:** Under the **First-Past-The-Post (FPTP)** system, parties hesitate to field women, claiming they are less "**winnable**" than dominant-caste men. Currently, major parties give less than **10%** of tickets to women.

- **The "Money and Muscle" Gap:** As highlighted in Milan Vaishnav's *'When Crime Pays'*, which has thrown light on this. He explains that Indian politics runs on two things: **Money and Muscle**. Elections are incredibly **expensive**, and parties love candidates who **bring their own black money or have local strongman** (goonda) networks. Due to lack of both money and muscle, Women are structurally locked out of this. They usually don't control the family wealth, and they certainly aren't part of local criminal mafias."

- **The Double Burden:** Cultural expectations regarding unpaid care work and domestic duties make the 24/7 nature of political campaigning difficult for women to sustain.

- **Toxic Political Environment:** Female politicians are disproportionately targeted with **sexist remarks**, online character assassination, and character-based gatekeeping.

II. Linkage with Delimitation and Federal Tensions

By tying the **Women Reservation Act to Delimitation**, gender justice has been entangled with India's most sensitive **Federal issue**:

- **North-South Divide: Southern states**, which have successfully controlled population growth, fear losing parliamentary seats to Northern states with higher growth rates.

- **Hostage to Deadlock:** Since **delimitation has been frozen since 1976** (extended in 2001) to prevent this imbalance, any delay in resolving this federal friction will automatically delay women's reservation.

III. Design Gaps in the 2023 Act

- **Exclusion of Upper Houses:** The Act does not apply to the **Rajya Sabha** or **State Legislative Councils**, limiting women's presence in houses that provide expert scrutiny.

- **Lack of OBC Sub-Quota:** Unlike SC/ST women, there is no sub-reservation for **Other Backward Classes (OBC)** women, who represent nearly 40% of the female population, potentially leading to the "elite capture" of reserved seats.

- **Operational Ambiguity on Rotation:** The Act mandates seat rotation after each delimitation, but lacks clarity on how candidates will nurture constituencies if their boundaries change every few years.

Global Best Practices for Representation

- **The Zipper System (Sweden):** Political parties alternate between male and female candidates on their lists (**Man-Woman-Man**), ensuring 50% representation.
- **Voluntary Party Quotas (South Africa):** Parties voluntarily commit to fielding a certain percentage of women candidates without the need for a constitutional mandate.
- **Reserved Seat Model (Rwanda):** Rwanda leads the world with over **60%** women in parliament through a combination of reserved seats and proportional representation.

Possible Strategies for Accelerating Implementation

To bridge the gap between promise and practice, the following measures are suggested:

- **Constitutional Delinking:** Amend the Act to remove the mandatory link to the Census and Delimitation.
- **The Power of Article 15(3):** Utilize **Article 15(3)**, which empowers the State to make **"special provisions for women and children,"** to justify immediate reservation within the existing 543 seats.
- **Interim Expansion:** Incremental expansion of the Lok Sabha by adding seats specifically for women before the full-scale delimitation.
- **Ticket Reservation:** Amend the **Representation of the People Act, 1951** to mandate that all recognized political parties reserve 33% of their tickets for women.

Conclusion

The **Women Reservation Act** represents a landmark yet deferred promise, where procedural hurdles delay substantive justice until 2034. By linking reservation to delimitation, the Act risks becoming a symbolic gesture that stalls **Anne Phillips' "Politics of Presence."** To achieve true democratic legitimacy and inclusive growth, India must resolve federal frictions and ensure that **representation delayed does not become representation denied**.

> **Q.** *In light of the Women's Reservation Act, 2023, identify the structural, socio-political, and institutional barriers that limit women's effective political participation in India. Suggest measures for accelerated implementation. (250 Words)*

1.1.2. AVIATION SAFETY AND NON-SCHEDULED OPERATORS IN INDIA

Context

- A cluster of recent aviation mishaps, including small aircraft crashes at **Baramati (Maharashtra)** in January 2026, near **Simaria (Jharkhand)**, and a helicopter crashlanding near **Mayabunder in the Andamans**, signals **deep-rooted safety concerns** in India's **non-scheduled operators (NSOs)** sector.

- These incidents emphasize that **charter aviation** requires rigorous regulation akin to **scheduled commercial flights,** as the sector's growth heightens oversight imperatives.

Background: The NSO Landscape in India

- **Definition of NSOs:** Non-Scheduled Operators are entities that provide air transport services (passenger or cargo) without a published timetable, often operating on a charter basis.
- **Current Scale:** As of late 2025, India has approximately **133 NSO permit holders** utilizing a diverse fleet of fixed-wing aircraft and rotary-wing (helicopters) assets.
- **Growth Drivers:** The expansion of the NSO sector is fueled by the rise in **VIP travel, religious tourism (heli-pilgrimage), medical evacuations (Air Ambulances), and corporate logistics**, often operating in **"uncontrolled environments"** or **remote airfields** where commercial airlines do not fly.

Present Scenario of Aviation Industry in India

- **Position in the Global Aviation Market**: India ranks as the **third-largest domestic aviation market** after the **US and China**, managing about **4.2% of global air traffic**. The **Indian aircraft fleet** constitutes roughly **2.4% of the world fleet**, growing rapidly due to **fleet expansions and new aircraft orders**.
- **Growth in Passenger Numbers**: Domestic **air passenger demand** is estimated to reach **715 million by 2030** and is projected to grow to around **1.1 billion by 2040**, a six-fold increase from current levels.
- **Expansion of Airport Infrastructure**: The number of functional airports increased from **74 in 2014 to 163 in 2025**. By 2047, the aim is to have **350–400 airports**, emphasizing **greenfield development** and **public-private partnership (PPP) models**.
- **Contribution to the Economy**: In 2025, the aviation sector supports over **7.7 million jobs** and contributes approximately **1.5% to India's GDP**.
- **Regulatory Evolution in Civil Aviation**
  - **Air Corporations Act, 1953**: Nationalised nine airlines, giving **government-owned carriers a dominant role** until the mid-1990s.
  - **Open Sky Policy (1990–94)**: Allowed private **air taxi operators**, ending the **monopoly of Indian Airlines (IA) and Air India (AI)**.
  - **Bharatiya Vayuyan Adhiniyam, 2024**: Replaced the **Aircraft Act, 1934**, aligning Indian laws with **ICAO standards** and the **Chicago Convention**. Supports **Make in India** and **Atmanirbhar Bharat** initiatives in aviation, simplifies **licensing and regulations**, establishes a **structured appeals process**, and modernises **aviation governance**.

Regulatory Structure Overseeing Aviation Industry in India

- **Policy and Strategic Oversight:** The **Ministry of Civil Aviation (MoCA)** leads overall direction for the sector.

o It sets **national policies** like the **National Civil Aviation Policy (NCAP)** and manages **international air service agreements**. **MoCA** drives key programs such as **UDAN** for regional flights and airport privatization efforts.

- **Safety and Operations Regulation:** The **Directorate General of Civil Aviation (DGCA)** handles technical rules and enforcement.

o DGCA creates **Civil Aviation Requirements (CARs)** for flight operations, pilot rest limits, aircraft upkeep, and airline standards. It grants **Air Operator Certificates (AOCs)**, approves new planes, and runs safety checks.

- **Accident Investigation:** The **Aircraft Accident Investigation Bureau** (AAIB) is a **statutory body** under **India's Ministry of Civil Aviation**, established in **2012** per **Aircraft (Investigation of Accidents and Incidents) Rules, 2017**, to probe civil aviation accidents and serious incidents independently of regulatory functions.

o Investigations follow **International Civil Aviation Organization (ICAO) Annex 13** rules, focusing only on causes and safety advice. Findings help prevent future risks without assigning blame.

▪ **ICAO** is a specialized **United Nations agency** that sets **global standards** for safe, orderly, and sustainable international civil aviation, including safety, navigation, and environmental practices.

- **Security Management:** The **Bureau of Civil Aviation Security (BCAS)** ensures protection across aviation.

o **About Bureau of Civil Aviation Security (BCAS)**: Established in **1987 under Ministry of Civil Aviation**, BCAS sets aviation **security standards per ICAO Annex 17**, overseeing **passenger screening, access control, cargo security, and compliance audits** at airports.

▪ **Headquartered in New Delhi**, it operates **four regional offices** at **major international airports: Delhi, Mumbai, Kolkata,** and **Chennai**. Led by a **Director General of Police (DGP)-rank officer** designated as **Commissioner of Security**.

▪ It conducts **mock drills, issues directives, and trains personnel** via **Aviation Security Training Institute (ASTI)** in Gurgaon to counter threats like terrorism in India's growing aviation sector.

o The **BCAS** releases **security guidelines** for **airlines, airports, and ground handling agencies,** and works in close coordination with **intelligence and law enforcement authorities.**

- **Key Legislative Measures:** Modern laws update old rules for better efficiency.

o **Bhartiya Vayuyan Adhiniyam, 2024** replaces the **1934 Aircraft Act,** simplifying **DGCA** roles, boosting safety checks, and raising fines.

o **Protection of Interest in Aircraft Objects Act, 2025** fixes gaps in global leasing rules, aiding quick plane recovery and lender trust.

- **Global Standards and Compliance:** India, as a contracting state to the **International Civil Aviation Organization (ICAO)**, must follow its **Standards and Recommended Practices (SARPs)** covering **aircraft certification, airworthiness, safety systems, accident probes,** and **environmental rules.**

o Compliance with the **Chicago Convention** shapes **India's global aviation reputation**, influencing insurance costs, leasing terms, and trust from other nations for international flights.

Major Challenges in India's Aviation Industry

- **Pilot Training and Skill Shortages**: Limited availability of **flight simulators**, shortage of **qualified instructors**, high **training expenses**, and restrictions related to **type-rating certification** have made pilot supply rigid. The approval of nearly **236 temporary foreign pilots in 2025** reflects dependence on short-term and costly solutions.

- **Market Dominance and Systemic Risks**: The domestic market is largely dominated by **IndiGo (around 63–65%)** and the **Air India Group (about 27–28%)**, together accounting for almost **90% of passenger traffic**. IndiGo serves as the **only airline on nearly 60% of routes**, meaning operational disruptions can lead to complete loss of service on those routes.

- **Insufficient Operational Buffer**: Unlike global airlines that maintain **20–25% standby crew strength**, Indian carriers operate at near **full capacity utilisation**, leaving minimal buffer to manage sudden operational disturbances.

- **Regulatory Weaknesses**: Almost **half of the sanctioned technical posts in DGCA remain vacant**, reducing effective oversight. Service disruptions are often addressed through **temporary schedule relaxations** instead of consistent regulatory enforcement, indicating reactive management.

- **High Costs and Fuel Price Fluctuations**: Airlines face persistent financial strain due to fluctuating **Aviation Turbine Fuel (ATF) prices**, which are closely linked to **global crude oil rates and U.S. dollar movements**, creating cost uncertainty.

- **Frequent Airline Insolvencies**: The collapse of carriers such as **Kingfisher Airlines (2012)**, **Jet Airways (2019)**, and **Go First (2023)** underscores ongoing **financial instability and structural weaknesses** in the sector.

- **Increasing Safety and Compliance Risks**: Rising air traffic, repeated operational breakdowns, and the issuance of **19 safety violation notices by DGCA in 2025** highlight mounting concerns regarding **regulatory compliance and systemic resilience**.

Key Strategies to Strengthen Aviation Industry in India

- **Shift from Short-Term Fixes to Long-Term Reforms**: Replace **ad hoc schedule relaxations** with **institutional strengthening** to ensure the aviation system can handle rising **passenger demand**, projected to reach **715 million by 2030**.

- **Strengthen Regulatory Supervision**: Fill **vacant technical positions** in the **DGCA** and implement **rule-based and risk-based supervision** to improve **safety compliance** and build **regulatory credibility**.

- **Develop Comprehensive Pilot Training Facilities**: Increase **simulator availability**, strengthen **domestic training institutes**, simplify **licensing procedures**, and resolve **type-rating constraints** to meet future **pilot demand** and reduce reliance on **temporary foreign pilots**.

- **Institutionalise Crew Reserve Standards**: Set **minimum spare crew thresholds** aligned with **global norms (20–25%)** to prevent **cascading flight disruptions** during peak travel or operational shocks.

- **Promote Viable Regional Airlines**: Go beyond granting **NOCs** by ensuring **effective UDAN subsidies**, **priority slots at congested airports**, and coordinated growth of **Tier-II and Tier-III airport infrastructure**, reducing dependence on **dominant carriers**.
- **Optimize Aviation Fuel Policies**: Consider **tax reforms on Aviation Turbine Fuel (ATF)** and explore **fuel hedging strategies** to mitigate **global price volatility** and **currency-linked cost fluctuations**.

Conclusion

To ensure **India's rapid aviation growth** remains secure, the government must move beyond policy and enforce a "**zero-tolerance**" **approach toward safety violations** within the expanding **non-scheduled sector**. Ultimately, success depends on **bridging the gap between commercial interests and safety standard**s through transparent oversight, better pilot training, and robust institutional support.

> **Q.** India's Non-Scheduled Operators (NSOs) sector has witnessed multiple accidents, exposing systemic safety and regulatory gaps. Critically examine the key issues faced by India's aviation industry and suggest strategies for strengthening regulatory oversight and regional connectivity.
>
> (250 words)

1.2. SOCIAL JUSTICE

1.2.1. REDEFINING TRIBAL WOMEN'S INHERITANCE RIGHTS

Context:

- The question of **women's inheritance rights** in **tribal communities** remains unresolved. Most **tribal customary laws** deny women absolute rights over property.
- Moreover, the **Hindu Succession Act, 1956**, which grants **daughters equal rights in ancestral property**, does not apply to **Scheduled Tribes**, thereby excluding tribal women from its protection.
- However, recently, the **Supreme Court of India** has dealt with cases concerning inheritance rights of tribal women. In some instances, it granted rights to those who had adopted **Hindu customs** ("**Hinduisation**"), while in others it **upheld their exclusion based on statutory exemptions.** This inconsistent approach has created **legal uncertainty for tribal women** whenever questions of inheritance arise.

Background: The Hindu Succession Act and Tribal Exclusion

The primary legal hurdle for tribal women lies in the statutory architecture of the **Hindu Succession Act (HSA), 1956**.

- **The Scope of Section 2(1):** This section defines the **applicability of the Act to anyone who is a Hindu by religion** or **falls under the broad category of "Hindus"** (**including Buddhists, Jains, and Sikhs**). Historically, courts often used this section to "bring in" tribal individuals who had adopted Hindu customs, a process known as **"Hinduisation."**

- **The Overriding Effect of Section 2(2):** Crucially, **Section 2(2)** acts as a proviso, stating that notwithstanding anything in **Section 2(1),** the Act **shall not apply** to any Scheduled Tribe within the meaning of **Article 342** (which empowers the President to specify tribes or tribal communities as Scheduled Tribes, thereby providing them a distinct legal status separate from the HSA), unless the **Central Government** specifically notifies otherwise in the Official Gazette.

- **The 2005 Amendment:** The **Hindu Succession (Amendment) Act, 2005** granted daughters equal **coparcenary rights** (the legal right to be a joint heir to ancestral property from birth, enjoying the same rights as sons to claim partition and ownership).

  o However, because of Section 2(2), these benefits did not extend to tribal women. This has created **"invidious discrimination,"** where a **non-tribal woman** enjoys **statutory property rights** while a tribal woman in the same region is left to the mercy of restrictive customs.

- **Resultant Vacuum:** In the absence of statutory law, succession is governed by **un-codified customary practices**. These are frequently **patrilineal**, aiming to keep land within the **male lineage** to prevent "**alienation**" to outsiders through marriage.

Defining 'Hindu' and the "Hinduisation" Critique

The term "Hindu" lacks a rigid definition, encompassing diverse practices rather than a singular creed, which has historically complicated tribal legal status.

- **Broad Judicial Interpretation:** In *Sastri Yagnapurushadji v. Muldas Brudardas Vaishya (1966)*, the Supreme Court famously described the Hindu religion as a **"way of life"** that does not claim any one prophet, worship one God, or subscribe to a single dogma or set of rites.

- **The Mechanics of Identity:** A person can be a **Hindu by birth** or through **bona fide conversion**, which requires a clear intention and unequivocal conduct.

  o A converted person remains a member of their tribe unless they and their ancestors have long abandoned tribal customs, including customary laws of marriage and inheritance.

- **Implications for Tribals:** Previously, courts broadened Section 2(1) to include tribes by arguing they weren't "expressly excluded" there. However, this contradicted Section 2(2) and forced tribal women into a coercive choice: abandon their indigenous identity to become "Hindu" for the sake of economic rights, or retain their identity and remain landless.

Landmark Judicial Interventions: A Shift in Jurisprudence

Recent verdicts have reframed the debate by applying the principles of **Transformative Constitutionalism** to the traditionally insulated sphere of tribal customary law.

- **The Principle of Equality (*Ram Charan v. Sukhram*, 2025):** The Court recognized that excluding daughters from ancestral property violates the fundamental right to equality under **Article 14** and the prohibition of discrimination under **Article 15(1)**. It emphasized that biological differences

should not be a basis for denying succession and that in the absence of codified law, principles of **justice, equity, and good conscience** must apply to grant women their share.

- **Reaffirming Jurisdictional Boundaries (*Nawang v. Bahadur*, 2025):** A Bench of Justices Sanjay Karol and Prashant Kumar Mishra overturned a Himachal Pradesh High Court order that had granted rights to 'Hinduised' tribal daughters. The Supreme Court clarified that the judiciary cannot overstep its jurisdiction to "legislate" by extending the HSA to tribes; that power rests solely with **Parliament**.

- **Protecting Indigenous rubric:** The Court affirmed that tribal inheritance remains governed by the **customary practices** of the community unless the Central Government officially intervenes. This ruling ended the inconsistent practice of granting rights based on "Hinduisation," which had previously created legal uncertainty and forced a choice between tribal identity and property rights.

Strategic Significance: Why This Matters

The rethinking of tribal inheritance is not merely a legal technicality; it has deep socio-economic implications for the progress of indigenous communities:

- **Economic Empowerment:** Establishing **property rights** provides tribal women with **collateral for credit**, enabling entrepreneurship and financial independence. It creates a robust safety net against poverty and mitigates the risk of domestic vulnerability by ensuring shelter and land security.

- **Social Justice and Equity:** Correcting this legal exclusion dismantles the "second-class citizen" status of tribal women compared to their non-tribal counterparts. It fulfills the constitutional promise of **Substantive Equality**, where **justice is determined by outcomes rather than just formal procedures.**

- **Integration without Assimilation:** By advocating for a **separate law** rather than a forced merger into the HSA, the state acknowledges that equality can—and should—exist within the framework of **Cultural Pluralism**. It allows tribes to modernize their internal structures without losing their unique identity.

Multidimensional Challenges: The Roadblocks to Reform

Despite judicial nudges, several hurdles persist in the transition to a gender-just inheritance system:

- **Land Alienation Paradox**: Communities resist female inheritance under **Fifth/Sixth Schedules** fearing **exogamous marriages** transfer land to non-tribals, as **Chhotanagpur customs** (reinforced by **CNTSP Act, 1908**) mandate **Khandan**-male succession to safeguard communal land bases.

- **Orality-Legal Uncertainty**: Uncodified **customary laws** allow patriarchal elites to manipulate interpretations, with **Article 371A (Nagaland)** enabling village-specific variations that burden women with proving "**ancient and certain**" usage per **Madhu Kishwar (1996)**.

- **Patriarchal Inertia**: Land is entrenched as a **male lineage preserve**, compelling women to relinquish High Court-won shares (e.g., **Santhal** cases) under social coercion for "familial harmony," violating **Article 21** dignity amid **NCRB**-tracked violence surges.

- **Jurisdictional Limbo**: While **Ram Charan (2025)** affirms equity-based equality, **Nawang (2025)** prohibits **HSA** extension, stranding tribal women in a statutory void dependent on **Parliamentary action** to fulfill **Article 39(b)-(c)** resource equity.

- **Implementation Disparities**: **Patrilineal dominance** in tribes like Gonds and Oraons, coupled with illiteracy and remoteness, undermines **PESA Gram Sabha** enforcement; **Mizoram**'s codification contrasts mainland inconsistencies, encouraging **forum shopping**.

- **Lingering Jurisdictional Dilemma:** While *Ram Charan* case established the moral and constitutional right to equality, *Nawang* case restricted the judicial path to achieving it. This leaves tribal women in a state of **legal limbo**: they are entitled to equality in theory, but cannot claim it through existing statutes like the HSA, leaving the resolution entirely dependent on legislative will.

Way Forward: Bridging the Parity Gap

To resolve tensions between **Constitutional Morality** and **Customary Autonomy**, a structured multi-pronged strategy is essential, harmonizing **tribal identity** with **gender equality** through legislative, judicial, and policy innovations.

- **Codification on Mizoram Model**: States with significant **Scheduled Tribe** populations (e.g., Jharkhand, Odisha, Chhattisgarh) must codify succession laws, emulating Mizoram's framework where daughters receive shares while safeguards like youngest son's **elder-care premium** prevent **land alienation** to non-tribals and preserve matrilineal elements.

- **Parliamentary Intervention**: **Hindu Succession Act (HSA), 1956** cannot be judicially extended per **Nawang v. Bahadur (2025)**; Parliament should enact a dedicated **Tribal Succession Act** mirroring HSA's equality provisions (post-2005 coparcenary rights) but customized to **tribal land-holding patterns** under **FRA, 2006** and **PESA, 1996**.

- **Institutional Strengthening**: Empower **National Commission for Scheduled Tribes (NCST)** and **Tribal Advisory Councils** for custom audits, gender sensitization, and awareness campaigns; establish **fast-track tribal inheritance courts** integrated with **e-Courts** for rural access.

- **Policy Synergies and Monitoring**: Link reforms with **Forest Rights Act (2006)** titling and **PESA (1996)** Gram Sabhas via mandatory **gender audits**; launch SHG-led land pooling initiatives; mandate annual **Ministry of Tribal Affairs** reports to Parliament tracking tribal women's property ownership metrics.

Conclusion

The rethinking of tribal women's inheritance rights is a step toward **substantive equality**. By moving beyond the binary of "Hinduisation" and acknowledging that Articles 14 and 15 apply to every citizen, the Indian legal system can finally bridge the gender parity gap. True empowerment lies in a framework where a tribal woman does not have to sacrifice her identity to claim her rightful share of ancestral dignity.

> **Q.** *Transformative Constitutionalism seeks to harmonize fundamental rights with customary practices. Analyse this statement with reference to tribal women's inheritance rights. (250 Words)*

1.3. INTERNATIONAL RELATIONS

1.3.1. INDIA-ISRAEL STRATEGIC PARTNERSHIP

Context:

- Amidst significant **geopolitical turbulence** in **West Asia**—characterized by a massive American military presence in the **Persian Gulf** and a **fragile ceasefire in Gaza**—the **Prime Minister of India** is undertaking a **high-profile, two-day** standalone visit to Israel, **solidifying** India's "**de-hyphenation**" strategy.

- This visit marks the **second time** an **Indian Prime Minister** has visited the nation, following the **historic 2017 trip**.

About India's De-Hyphenation Policy Towards Israel

1. **Historical Background**

    - **Creation of Israel: Israel was created in 1947** following the **Balfour Declaration**. The **UN Partition Plan** conceived **two separate states** — a **Jewish State (Israel)** and an **Arab State (Palestine)** — but its implementation led to the displacement of Palestinians and a protracted conflict.

    - **India's Initial Hyphenated West Asia Policy:** As a result of the regional conflict, India initially pursued a **Hyphenated West Asia Policy**, wherein **Israel and Palestine were considered as one diplomatic block** in foreign policy. Although **Israel was recognized in 1950**, the following approach was adopted:

      o **Full diplomatic relations were avoided for decades.**

      o **Strong support was extended to the Palestinian cause**, including the recognition of **Palestine in 1988**.

    - The main problem with the hyphenation policy was that **any growing closeness with Israel was perceived as abandonment of Palestine**.

2. **Key Diplomatic Milestones Before De-Hyphenation**

    - Following support from Israel during the **Kargil War**, the **Vajpayee Government** sent the first-ever high-level Indian ministerial delegations to Israel in 2000, including:

      o **External Affairs Minister Jaswant Singh**

      o **Home Minister L.K. Advani**

    - In **2003**, **Ariel Sharon** was hosted in New Delhi, becoming the first Israeli Prime Minister to visit India.

    - In **October 2015**, **President Pranab Mukherjee** became the first Indian Head of State to visit the region, and both **Israel and Palestine were visited in the same trip**, thereby continuing the hyphenated approach.

3. **What is the "De-Hyphenation" Policy?**

- **De-hyphenation means that relations with Israel and Palestine are treated as two completely separate tracks.**
- Under this approach:
  o **Defence technology can be procured from Israel.**
  o **Support for an independent Palestinian state can continue.**
  o **Humanitarian aid can be sent to Gaza.**
- One relationship is not allowed to dictate the other.
- For instance, in **2017**, the first-ever **standalone visit to Israel by an Indian Prime Minister** was undertaken, thereby breaking the diplomatic hyphen.
  o Previously, state dignitaries used to visit **Israel and Palestine in the same trip**, reflecting the hyphenated approach.

4. **Evolution of India-Israel Relations**

The bilateral trajectory is categorized into distinct chronological phases:

- **The "Taboo" Phase (1950s – 1980s):** Friendship with Israel was considered a **"taboo"** due to the **Cold War** and solidarity with **Arab nations**. During the **1967 Six-Day War**, India strongly backed the Arab states.
- **The "Cautious Stance" (1992):** Full diplomatic relations were established. This was enabled by the **Oslo Accords** (Arab-Israeli peace process), allowing India to engage Israel without estranging Arab states.
- **The "Strategic Dimension" (2014 – Present):** The relationship became **openly strategic**. The 2026 visit marks only the second time an Indian PM has ever visited Israel.

5. **Modern Dimensions of Cooperation**

- **Beyond Weapons to Water:** India is currently **Israel's biggest defense customer**, buying **34% of their arms exports**. Cooperation also includes the establishment of **35 "Centers of Excellence"** for advanced farming and **water management technology**.
- **Recalibrated UN Voting:** Historically, votes were cast against Israel. Recently, India has **abstained from certain votes** (such as calls for a truce) because the resolutions did not condemn the **terrorism of Hamas attacks**. **India remains clear**: **support for Palestine is maintained,** but **terrorism is not accepted**.

Why Israel is important for India

1. **Critical Defence Support:** Israel emerged as a **reliable strategic partner** when India faced international constraints during the Kargil conflict.

- Supplied **laser-guided bombs (LGBs)** that enabled precision strikes in high-altitude terrain
- Provided **UAVs (Searcher, Heron)** for real-time surveillance
- This timely assistance highlighted Israel's value as a partner willing to support India during crises, unlike many Western suppliers.

2. **Advanced Defence Technology and Joint Development:** Israel is a major source of **cutting-edge military technology** for India. Key examples include:

   - **Barak-8 / MRSAM** missile system (jointly developed with DRDO)
   - **Phalcon AWACS** mounted on Indian aircraft
   - **Spike anti-tank guided missiles**
   - These systems significantly enhance India's air defence, battlefield awareness, and strike capability.

3. **Counter-Terrorism and Internal Security Expertise:** Israel's experience in combating terrorism has translated into cooperation in:

   - Intelligence sharing
   - Urban warfare tactics
   - Homeland security and border management
   - Technologies such as **surveillance systems, electronic warfare equipment, and cyber-security tools** are particularly relevant for India's internal and border security challenges.

4. **Agriculture and Water Management Technologies:** Israel has contributed to India's **food and water security** through technology transfer in:

   - **Drip irrigation and micro-irrigation**
   - Desert agriculture
   - Water recycling and desalination techniques Over **30 Indo-Israeli Centres of Excellence** operate across Indian states, improving productivity in **horticulture and dry-land farming**.

5. **Economic and Developmental Pillars:** Beyond defense, the relationship is anchored in "soft" sectors that impact India's internal development:

   - **Water and Agriculture:** Israel's **MASHAV** agency has facilitated over 35 **Centres of Excellence** in India. Technologies in drip irrigation, desalination, and dry-land farming are vital for India's water-stressed regions like Rajasthan and Haryana.
   - **Trade and Investment:** Bilateral trade reached **$3.75 billion** (FY2024-25). Current negotiations for a **Free Trade Agreement (FTA)** and the Bilateral Investment Agreement (signed Sept 2025) aim to diversify trade into electronics, medical equipment, and green energy.
   - **The IMEC Corridor:** The visit seeks to revitalize the **India-Middle East-Europe Economic Corridor**. As a shorter, secure alternative to the **Suez Canal,** IMEC positions Israel (specifically **Haifa Port**) as a bridge for Indian goods entering Europe.

Regional Dynamics and the "Hexagonal Alliance" Proposal

Israeli Prime Minister Benjamin Netanyahu has proposed a **"Hexagonal Alliance"**—a six-sided partnership involving **India, Greece, Cyprus, and Arab nations**—to counter "radical axes" in the region. This presents a complex diplomatic landscape for India:

Geopolitical Challenges in the West Asian Matrix

Navigating the intricate web of rivalries in West Asia remains a primary challenge:

- **The Iran Dilemma:** Iran is deeply hostile to Israel and fosters the Palestinian cause. For India, Iran is vital for the **Chabahar Port** to reach **Central Asia**. Joining Israel's proposed **"hexagonal alliance"** could severely damage ties with Tehran.
- **The Turkey Factor:** Turkey opposes Israel to claim leadership in the Islamic World. India must navigate this carefully, as Turkey also supports **Pakistan on the Kashmir issue**.
- **Moderate Arab States:** Today, India does massive business with **Saudi Arabia, the UAE, and Oman**. These nations are now largely comfortable with India talking to Israel, as seen in the **I2U2 framework**.
- **The US Factor:** In the past, India opposed America's presence in the Middle East. Today, India and the US work closely together to bring stability to the region, creating partnerships like **I2U2(India, Israel, the United Arab Emirates, and the United States)** and the **IMEC trade route**.

Way Forward: Practicing "Principled Pragmatism"

India's future trajectory in West Asia should be defined by a careful balance of national interest and ethical diplomacy:

- **Preserving Strategic Autonomy:** Netanyahu's proposal for a **"hexagonal alliance"** should be politely declined. India's long-standing policy of avoiding military alliances against third countries ensures it does not become a party to regional sectarian conflicts.
- **Prioritizing Developmental Growth:** The relationship with Israel must be leveraged primarily for its strengths in **futuristic defense technology (Mission Sudarshan Chakra)**, advanced **agriculture**, and **water management** to support India's domestic goals.
- **Active Advocacy for Regional Stability:** India should utilize its unique position—as a friend to both Israel and the Arab world—to advocate for a **peaceful, two-state solution**. Promoting stability is essential for the long-term viability of economic projects like the **IMEC corridor**.
- **Leadership in the Global South:** Ensure that while deepening ties with **Tel Aviv**, India continues to advocate for **humanitarian stability** in **Gaza** to maintain its moral standing among developing nations.

Conclusion

The visit reflects the consolidation of a **mature, interest-driven partnership** between India and Israel. While defence cooperation remains central, the relationship has expanded into technology, agriculture, innovation, and connectivity. However, engagement must be carefully calibrated within the complex geopolitics of West Asia.

A policy of **"Principled Pragmatism"** — combining strategic autonomy, economic cooperation, and commitment to peace — would enable India to safeguard its national interests while contributing constructively to regional stability.

> **Q.** *Discuss the strategic significance of Israel in India's foreign policy calculus. How has the relationship evolved from cautious engagement to an openly strategic partnership? (250 Words)*

***

2.1. ECONOMY

2.1.1. INDIA'S CRITICAL MINERALS STRATEGY

Context:

- The **Union Budget 2026-27** marks a decisive paradigm shift: **critical minerals** are now positioned as a **core pillar** of India's **industrial, energy transition, defence, and geopolitical strategy**.

- Just **three years ago**, during India's **G20 Presidency (2023)**, **critical minerals** were peripheral in policy discourse. Minerals such as **lithium** were still classified as **atomic minerals**, restricting private sector participation.

- This Budget speech's emphasis signals that India has moved from "**whether to have a policy" to "how to execute at scale, speed, and depth".** This aligns with **Atmanirbhar Bharat**, **Viksit Bharat @2047**, and **Net Zero 2070** goals.

Understanding Critical Minerals

Critical minerals refer to **non-fuel, non-ferrous metals** and their compounds that are vital for the **clean energy transition**, **advanced manufacturing**, **defence technologies**, and **digital economy**. These minerals underpin essential technologies such as **electric vehicles (EVs)**, **batteries**, **solar panels**, **wind turbines**, **semiconductors**, and **rare earth magnets**.

- **India's Official List (30 Minerals)**: Notified under the **Mines and Minerals (Development and Regulation) [MMDR] Amendment Act, 2023** (a law streamlining mining auctions and private participation)-includes **lithium**, **cobalt**, **nickel**, **graphite**, **rare earth elements (REEs)** (a group of **17 elements** like **neodymium** and **dysprosium**), **beryllium**, **tantalum**, **niobium**, **tungsten**, **phosphorus**, and others.

- **Global Context**: **China dominates 60-90%** of mining and processing capacity for over **20 critical minerals** (per **US Geological Survey [USGS] 2025 data**); this exposes vulnerabilities, as seen in the **2025 rare earth magnet embargo** and global battery shortages.

- **Key Risks**: Extreme **price volatility**, **supply chain weaponization** by dominant players, and escalating **geopolitical tensions** amid India's **net-zero by 2070** pledge and global decarbonization goals.

Why Critical Mineral Matters for India

The pursuit of **critical minerals** represents a **strategic imperative** for India, securing **mineral security** to bolster **Atmanirbhar Bharat**.

- **Economic Security**:

- Reduces **100% import dependence** on key battery metals like **lithium** (sourced from Australia/Chile), **nickel**, and **cobalt** (from DRC/Indonesia).
- Boosts **Production Linked Incentive (PLI) schemes**, including **₹18,100 crore** for advanced chemistry cells (batteries) and **₹24,000 crore** for solar PV modules.
- **Energy Transition**:
- Enables achievement of **500 GW non-fossil energy capacity** by 2030, as per India's **Nationally Determined Contributions (NDCs)** under Paris Agreement.
- Powers flagship initiatives like **PM Surya Ghar** (rooftop solar for 1 crore households) and **FAME-III** (targeting **30% EV penetration** in vehicle sales by 2030).
- **Geopolitical Edge**:
- Counters **China's 60-90% global monopoly** in processing; strengthens **QUAD Critical Minerals Initiative** (**Quadrilateral Security Dialogue**: India, US, Japan, Australia for Indo-Pacific resilience).
- Enhances **IPEF Supply Chain Pillar** (**Indo-Pacific Economic Framework**: **14 nations for resilient trade**) and aligns with **India-Middle East-Europe Economic Corridor (IMEC)** for diversified, secure sourcing.

Evolution of India's Critical Minerals Policy

India's approach to **critical minerals** has evolved rapidly from regulatory constraints to proactive strategy, driven by global supply risks and domestic ambitions.

- **Pre-2023**: Policy focus was limited, with many minerals like **lithium** under strict restrictions by the **Atomic Minerals Directorate (AMD)**, barring private exploration and mining.
- **2023 Milestone**: The **Mines and Minerals (Development and Regulation) [MMDR] Amendment Act** formally identified **30 critical minerals** and opened doors for private sector exploration through competitive auctions.
- **2024-25**: Government rationalized **royalty rates** to make mining viable and eased entry barriers for **junior miners**, encouraging early-stage investments.
- **January 2025**: Launched the **National Critical Mineral Mission (NCMM)** with a robust **~₹16,300** crore outlay to build end-to-end capabilities.
- **2026 Shift**: **Union Budget** marks a pivot from policy ambition to **implementation focus**, emphasizing execution at scale, speed, and depth.

National Critical Mineral Mission (NCMM)

Launched in **January 2025**, the **NCMM** serves as India's comprehensive, ambitious framework to achieve **mineral self-reliance**, placing the country alongside global leaders.

- **Financial Outlay**: ₹16,300 crore dedicated to exploration, processing, and R&D.
- **Core Targets**: Complete **1,200 exploration projects** by FY2031; intensify surveys for deep-seated and hard-to-access minerals using advanced tech.
- **Key Focus Areas**: Auctioning **Critical Mineral Blocks** nationwide; funding R&D for mineral **beneficiation** (value addition) and **recycling** to minimize waste.

- **Global Standing**: Aligns India with elite policies like the US's **Inflation Reduction Act (IRA)** (subsidies for clean tech minerals) and Australia's **Critical Minerals Strategy** (export-focused partnerships).

Key Institutions Driving Mineral Scale-Up

These institutions form the **backbone of India's mineral ecosystem**, enabling exploration, funding, acquisition, and tech integration for critical minerals.

Institution	Role & Full Form
GSI	**Geological Survey of India** — national mapping, surveying, and primary exploration agency.
NMET	**National Mineral Exploration Trust** — funds regional/detailed surveys for non-fuel, non-atomic minerals.
KABIL	**Khanij Bidesh India Ltd** (JV of **NALCO, HCL, MECL**)—secures overseas mineral assets and equity stakes.
Mission Anveshan	AI-powered seismic tools for **hydrocarbon discovery**; expandable to critical minerals via **National Geoscience Data Repository (NGDR)**—centralized geological data hub.

The Core Bottlenecks: Why Is India Vulnerable?

India faces severe challenges in securing these minerals:

- **Extreme Import Dependency:** India is **100% dependent on imports for 10** out of 30 critical minerals, including lithium, cobalt, and nickel.

- **China's Processing Monopoly:** Mining is *not* the main bottleneck; **processing** is. While India has some mining capabilities, China controls roughly 58% of global lithium refining, 65% of cobalt processing, and a staggering 87% of rare earth processing.

- **Weak Domestic Demand:** Investors hesitate to build expensive processing plants in India because there are no guaranteed domestic buyers yet. The local manufacturing of batteries, EVs, and solar equipment is simply not expanding fast enough to absorb the processed materials.

- **Technology Gaps:** Deep mineral exploration is **risky and expensive**. India has been slow to adopt **Artificial Intelligence** (AI) and advanced geospatial tools for discovering new deposits.

India's Master Plan for Critical Minerals Security: Integrated Strategy and Solutions

To secure these minerals, India is moving from **policy announcements to integrated action** across six key pillars:

A. Smarter Exploration (The NCMM)

- **The Strategy:** The government launched the National Critical Mineral Mission (NCMM) in 2025. Under this, the Geological Survey of India will conduct 1,200 targeted exploration projects by 2030-31.

- **How it helps:** By integrating AI and advanced data, India can speed up the discovery of local reserves, directly reducing reliance on imports.

B. Shifting Focus to Processing and Refining

- **The Strategy:** Shift from raw extraction to **high-purity processing by removing import duties** on **capital goods for critical mineral processing** (as per **Union Budget 2026-27**). Leverage existing capabilities in chemicals, pharmaceuticals, and textiles sectors for upgrading to battery-grade and defence-grade materials.

- **How it helps:** This directly attacks **China's monopoly**, allowing India to refine its own battery-grade materials locally.

C. Building the Rare Earth Ecosystem (Corridors & Magnets)

- **The Strategy:** The 2026-27 Union Budget announced "**Dedicated Rare Earth Corridors**" in **Odisha, Kerala, Andhra Pradesh, and Tamil Nadu.** These coastal states are rich in monazite sand, which contains rare earths. Alongside this, a ₹7,280 crore scheme will fund the manufacturing of 6,000 tonnes of permanent magnets.

- **How it helps:** Instead of **exporting raw sand**, these corridors will **centralize mining, processing, and manufacturing** in one place, creating an **end-to-end domestic supply chain.**

D. Creating Assured Domestic Demand

- **The Strategy:** Public policy must speed up the nationwide deployment of **EVs, battery storage, and wind projects**.

- **How it helps:** Creates **predictable offtake** for processed minerals, providing investor confidence to build midstream refineries and processing plants.

E. Forging Global Partnerships

- **The Strategy:** To break reliance on single suppliers, India is aggressively partnering with resource-rich nations:

  o **Russia:** Moving beyond traditional oil and weapons, India and Russia are now collaborating on critical minerals. **Russia has vast reserves of lithium and rare earths**. They are sharing processing technology and building logistics networks like the **Chennai-Vladivostok corridor**.

  o **Brazil:** Recently, **India and Brazil** signed an MoU focusing on rare earths. Crucially, this covers the entire "value chain"—from exploration and mining to recycling and refining.

  o **Global Assets:** India's state-owned joint venture, **KABIL (Khanij Bidesh India Limited),** is actively acquiring overseas mines, including securing lithium exploration blocks in **Argentina and Australia.**

  o **Use platforms like**:

    ▪ UK–India Critical Minerals Supply Chain Observatory

    ▪ India–EU Free Trade Agreement

F. AI-First Approach to Mineral Exploration

- To accelerate discoveries and cut **decades-long timelines**, India must adopt a **mandatory AI-first strategy** for mineral exploration, integrating key national missions for seamless synergy. Aligns with **NCMM's 1,200 projects target** by FY2031.

- **Core Integration**:
- **IndiaAI Mission** (national AI compute and talent hub for data-driven analytics).
- **National Geospatial Policy** (2022; enables high-res satellite/drone data for terrain mapping).
- **Mission Anveshan** (AI-powered seismic tools currently for **hydrocarbon discovery**; extend to critical minerals by linking with **National Geoscience Data Repository [NGDR]**—centralized geological database).

Conclusion

India has successfully moved critical minerals to the **strategic center** of its economic and defense planning. However, simply mining these materials will not secure our future. True success depends on building **large-scale processing plants**, rapidly growing our **domestic manufacturing** demand, adopting **AI for exploration,** and maintaining strong, **diversified global partnerships**.

> **Q.** *Critical minerals are the new oil of the 21st century. Examine India's evolving critical minerals strategy in the context of energy transition, industrial policy, and geopolitical competition.*
>
> *(250 Words)*

2.2. ENVIRONMENT

2.2.1. DEBUNKING THE PERCEPTION OF SAFETY IN BOTTLED WATER IN INDIA

Context

- In contemporary India, **packaged drinking water** has transitioned from an **occasional luxury to an indispensable everyday commodity**. This shift is primarily driven by a **systemic decline** in **public trust** regarding **municipal water supplies** and a prevailing perception that **plastic-sealed water is inherently safer**.

- However, emerging scientific evidence suggests that while **bottled water** may meet **basic microbiological standards**, it introduces a suite of **invisible chemical and physical contaminants** that pose significant long-term risks to human health and ecological stability.

Background: Structural Rise of Bottled Water Consumption

The Indian packaged drinking water market is one of the fastest-growing in the world, projected to expand at a **CAGR of 6.5% (2025–2035)**.

A. Expansion of Packaged Drinking Water Usage

- **Bottled water consumption** has increased due to **urbanisation, ageing public water infrastructure, intermittent municipal supply, and groundwater contamination**.
- Packaged water has become embedded in routine daily consumption across railway stations, offices, hospitals, and restaurants.

- A perception has been reinforced that "sealed" water implies "safe" water, without adequate consideration of invisible contaminants.

B. Institutional and Regulatory Framework

- Regulation is undertaken by the **Food Safety and Standards Authority of India (FSSAI)** under the Food Safety and Standards Act, 2006.

- Technical specifications are prescribed by the **Bureau of Indian Standards (BIS)**.

- Regulatory emphasis has historically focused on:

o **Microbial contamination control**.

o Specified heavy metals and chemical residues.

- However, standards do not currently mandate routine testing or limits for **microplastics and nanoplastics**, revealing an evolving regulatory gap.

Microplastics: The Invisible Threat

Microplastics (less than 5 millimetres) and their even smaller counterparts, **nanoplastics (<1 micrometer**), represent a new frontier of environmental and health challenges.

- **Pervasiveness in Indian Markets:** Research conducted in major Indian hubs like **Nagpur, Mumbai, and coastal Andhra Pradesh** has detected microplastics in **100% of tested samples**, with concentrations ranging from **72 to 212 particles per litre**.

- **Quality Control Disparity:** Studies indicate that locally bottled water frequently contains higher plastic concentrations than national brands, highlighting critical gaps in bottling hygiene and quality control.

- **The Nanoplastic "Barrier Breach":** Nanoplastics are particularly dangerous as they can cross **biological barriers** (cell membranes, blood-brain barrier, and placenta), entering the human circulatory system and vital organs.

- **Pathophysiological Impact:** These particles trigger **oxidative stress**, **chronic inflammation,** and **cellular damage**. Furthermore, they act as **"Trojan Horses"** by absorbing and transporting heavy metals and pathogens into the body..

- **Chemical Leaching Agents:** Common plasticizers like **Phthalates, Bisphenol A (BPA), and Antimony** (**used in PET production**) can migrate from the bottle into the water.

- **Environmental Triggers:** Exposure to **direct sunlight (UV radiation)** and the high ambient temperatures of Indian summers accelerate the chemical breakdown of plastic, increasing leaching rates.

- **Chronic Toxicity:** Unlike **acute bacterial poisoning**, chemical leaching causes **cumulative toxicity**. Many leached chemicals are known **endocrine disruptors**, which can interfere with hormonal signaling and lead to reproductive or developmental issues over time.

- **Regulatory Blindspot:** Current standards typically test for chemicals in isolation under controlled settings, failing to account for the **"cocktail effect"** of multiple chemicals interacting with microplastics over long durations.

Key Issues and Challenges in the Packaged Water Industry

The packaged water sector in India grapples with profound sustainability and health challenges, exacerbating groundwater stress, environmental degradation, and consumer vulnerabilities.

- **Groundwater Overexploitation**: The industry heavily depends on aquifers already under severe strain, with **minimal investments in recharge mechanisms** like **rainwater harvesting or artificial replenishment**. This intensifies water scarcity in regions like Punjab and Rajasthan, where extraction rates exceed sustainable yields.

- **Mineral Depletion Risks**: Processes such as **Reverse Osmosis (RO) filtration** remove vital minerals like **calcium and magnesium**, potentially leading to deficiencies and long-term cardiovascular issues, as evidenced by WHO concerns over demineralized water.

- **Environmental Footprint**: Single-use PET bottles fuel India's plastic waste crisis, where **less than 13%** undergoes effective recycling. The remainder fragments into microplastics, infiltrating soil, rivers, and food chains, amplifying ecological harm.

- **Information Asymmetry**: Consumers struggle to differentiate "**Natural Mineral Water**" (sourced from protected springs with stringent standards) from "**Packaged Drinking Water**" (**often purified municipal supplies**), undermining informed choices amid opaque labeling.

The Regulatory Landscape and Critical Gaps

India's regulatory framework for packaged water is currently undergoing a significant transition under the **Food Safety and Standards Authority of India (FSSAI)**.

- **The 2024 Regulatory Shift:** In late 2024, FSSAI removed the mandatory **BIS (Bureau of Indian Standards)** certification requirement to streamline licensing. Bottled water is now classified as a **"High-Risk Food Category"**, requiring **mandatory annual third-party audits.**

- **Testing Limitations (IS 14543):** While the **IS 14543** standard covers minerals, heavy metals, and microbes, it currently **does not include limits or testing protocols** for **microplastics** or **nanoplastics**.

- **Enforcement Deficit:** With thousands of **small-scale units, state-level monitoring** (as seen in **Karnataka surveys**) reveals frequent contamination by **pesticide residues** and **fluoride**, highlighting a gap between regulation and ground-level compliance.

Government Initiatives for Safe Water and Plastic Management

1. **Infrastructure and Access: Jal Jeevan Mission (JJM)**

Launched in 2019, the mission aims to provide **Functional Household Tap Connections (FHTC)** to every rural household by 2024 (now extended with revised targets for 2026).

- **Progress as of 2026:** Out of 19.36 crore rural households, over **15.8 crore (81.6%)** have been provided with tap water supply.

- **Water Quality Monitoring:** The mission has established over **2,800 Water Quality Testing Laboratories** and trained over **24 lakh women** at the village level to use **Field Testing Kits (FTKs)** for regular surveillance.

- **Source Sustainability:** Integrates mandatory groundwater recharge, rainwater harvesting, and greywater management to ensure the long-term viability of water sources.

2. **Urban Water Security: AMRUT 2.0**

   The **Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0** focuses on making cities "water secure."

   - **Universal Coverage:** Aims for 100% water supply coverage in all **4,700+ statutory towns**.
   - **Circular Economy of Water:** Focuses on the rejuvenation of water bodies and the recycling/reuse of treated used water to reduce the burden on fresh groundwater.
   - **Technological Integration:** Promotes "**Pey Jal Survekshan"** to foster healthy competition among cities regarding water quality and conservation.

3. **Regulatory Reforms: FSSAI's New Testing Scheme (2026)**

   Following the removal of mandatory BIS certification in late 2024, the **FSSAI** introduced a new, more stringent oversight mechanism.

   - **High-Risk Classification:** Packaged water is now a **"High-Risk"** food category, mandating **third-party audits** and stricter compliance.
   - **Compulsory Testing Scheme (Effective Jan 1, 2026):** Manufacturers must now conduct **monthly microbiological tests** and **quarterly chemical tests** (for heavy metals, minerals, and radioactive residues) through NABL-accredited labs.
   - **Outcome-Based Regulation:** Shifts accountability directly to the Food Business Operators (FBOs), requiring them to maintain inspection-ready digital records for five years.

4. **Addressing Microplastics: Plastic Waste Management Rules**

   The **Plastic Waste Management (Amendment) Rules (2024 & 2025)** have evolved to specifically target microplastic pollution.

   - **Definition of Microplastics:** For the first time, the 2024 rules defined microplastics as any solid plastic particle (1 micron to 1,000 microns) that is insoluble in water.
   - **Extended Producer Responsibility (EPR):** Producers and brand owners are legally responsible for the collection and recycling of the plastic packaging they introduce to the market.
   - **Digital Traceability (2025):** Mandatory **QR codes or barcodes** on all plastic packaging to enable real-time tracking from production to disposal, reducing leakages into water bodies.
   - **Ban on Single-Use Plastic (SUP):** A continued nationwide ban on low-utility, high-littering plastic items to prevent their fragmentation into secondary microplastics.

Way Forward: A Multi-Pronged Strategy

Addressing this "silent crisis" demands integrated policy reforms, technological innovation, and behavioral shifts, aligning with India's sustainable development goals.

- **Update Safety Standards**: Mandate FSSAI protocols for routine testing of microplastics, plasticizers (**e.g., phthalates**), and heavy metals, with real-time public dashboards for transparency.

- **Strengthen Municipal Supply**: Restore faith in tap water via initiatives like **Jal Jeevan Mission**, emphasizing infrastructure upgrades, third-party audits, and apps for quality disclosures to reduce packaged water reliance.
- **Promote Sustainable Alternatives**: Incentivize household point-of-use filters (e**.g., UF+UV systems**) and reusable containers like glass or stainless steel through subsidies and awareness campaigns.
- **Foster Circular Economy**: Rigorous enforcement of **Extended Producer Responsibility** (**EPR**) under the **Plastic Waste Management Rules,** 2022, to achieve 100% PET bottle collection, sorting, and high-grade recycling.

Conclusion

The reliance on bottled water in India is a complex symptom of a public utility deficit. While it provides a **temporary solution** for water access, the hidden costs—ranging from microplastic ingestion to groundwater depletion—suggest that the current model is unsustainable. For India to achieve **Sustainable Development Goal 6 (Clean Water and Sanitation)**, the focus must shift from **commercial convenience to a transparent, scientifically-backed regulatory framework** that prioritizes the long-term health of both the citizens and the environment.

Q. *The rapid growth of bottled water consumption in India highlights a trade-off between perceived safety and emerging health and environmental risks. Critically analyse challenges posed by the packaged drinking water industry and suggest a multi-sectoral strategy to ensure sustainable and equitable access to safe drinking water. (250 Words)*

***

Scan to know more about our courses...

IAS 2-Year GS PCM   **IAS 10-Month GS PCM**   **Degree + IAS**   **Prelims Test Series**