# SAMACHAR MANTHAN

## Table of Contents

# Economics

## IBC Amendment Bill, 2025

### Why in the News?
The Insolvency and Bankruptcy Code (Amendment) Bill, 2025 was introduced in the Lok Sabha by Finance Minister to streamline insolvency, cut tribunal delays, and add new tools like creditor-led resolution and cross-border insolvency.

### About the Insolvency and Bankruptcy Code (IBC), 2016:
- IBC is India's **bankruptcy law**, covering corporate persons, partnership firms, and individuals.
- **Insolvency**: Liabilities exceed assets; entity cannot meet obligations.
- **Bankruptcy**: Legal declaration of inability to pay debts.
- Objective: **Time-bound, creditor-driven resolution** to improve recovery and business confidence.
- **Regulating Authority**: Insolvency and Bankruptcy Board of India (IBBI), a statutory body with members from Ministry of Finance, Ministry of Corporate Affairs, and Reserve Bank of India.
- **Adjudicating Authority**:
- **National Company Law Tribunal (NCLT)** for companies/LLPs.
- **Debt Recovery Tribunal (DRT)** for individuals and partnership firms.

### Key Amendments Proposed in IBC (2025):
- **Creditor-Initiated Insolvency Resolution Process (CIIRP)**: Out-of-court creditor resolutions with NCLT approval; faster timelines and promoter involvement.
- **Group Insolvency**: Joint proceedings for related companies to preserve asset value and cut costs (e.g., Videocon Group case).

- **Cross-Border Insolvency**: Framework to handle overseas assets and debts, allowing Indian lenders access to foreign assets.
- **Pre-Packaged Insolvency (PPIRP)**: Faster, affordable restructuring route for Micro, Small, and Medium Enterprises (MSMEs) while operations continue.
- **Other Reforms**: Segregated asset sales, more NCLT benches (now 16), extended claim timelines, sector-specific provisions, and debtor audits.

### Achievements of IBC:
- **Debt Resolution**: Resolved ₹3.16 lakh crore in 808 cases since 2016 (CRISIL data).
- **Recovery Rate**: Average recovery of 32% of admitted claims, 169% of liquidation value.
- **Comparison**: Outperformed earlier mechanisms (DRT, SARFAESI Act, Lok Adalat) which achieved only 5–20% recovery.
- **Deterrence**: Borrowers pre-settled ₹9 lakh crore debt to avoid IBC proceedings.
- **Large NPAs**: Addressed RBI's "Dirty Dozen" cases like Bhushan Steel, Essar Steel, Jaypee Infratech.

> **[UPSC 2017]** Which of the following statements best describes the term 'Scheme for Sustainable Structuring of Stressed Assets (S4A)', recently seen in the news?
> Options: (a) It is a procedure for considering ecological costs of developmental schemes formulated by the Government.
> (b) It is a scheme of RBI for reworking the financial structure of big corporate entities facing genuine difficulties.
> (c) It is a disinvestment plan of the Government regarding Central Public Sector Undertakings.
> (d) It is an important provision in 'The Insolvency and Bankruptcy Code' recently implemented by the Government. *

## Minimum Public Shareholding (MPS)

### Why in the News?
SEBI has released a consultation paper proposing changes in Minimum Public Shareholding (MPS) and Minimum Public Offer (MPO) norms for listed companies.

## What is Minimum Public Offer (MPO)?

- **Meaning**: When a company launches an Initial Public Offer (IPO), it must sell a minimum number of shares to the public.
- **Analogy**: Like a new shop ensuring enough goods are displayed for customers — otherwise trading is thin and controlled by a few.

## What is Minimum Public Shareholding (MPS)?

- **Concept**: A company is like a cake. Promoters (founders/owners) usually keep most of it, but SEBI mandates at least **25% must be shared/sold with the public**.
- **Purpose**:
- Broader ownership and participation.
- Fairer prices by reducing manipulation.
- Greater accountability of companies.

## What SEBI is proposing?

- **Flexibility**: Large companies find it difficult to release big chunks of shares at once; rules will be eased.
- **Extended Timelines**:
- Companies valued at ₹50,000–1,00,000 crore now get up to **10 years** (instead of 5) to meet 25% MPS.
- They must reach **15% in 5 years** first, then 25% in 10 years.

- **Reduced Burden**: For very large companies, the initial Minimum Public Offer (MPO) will be lowered.

## Significance of the Move:

- **Market Stability**: Selling too many shares too quickly is like flooding the market — prices may fall even if the company is strong.
- **Benefits**:
- More big companies will list in India.
- Investors can enter gradually without sudden shocks.
- Encourages fund-raising while maintaining fair trading.

[UPSC 2024] Consider the following statements:
I. India accounts for a very large portion of all equity option contracts traded globally, thus exhibiting a great boom.
II. India's stock market has grown rapidly in the recent past, even overtaking Hong Kong's at some point in time.
III. There is no regulatory body either to warn small investors about the risks of options trading or to act on unregistered financial advisors in this regard.
Which of the statements given above are correct?"
Options: (a) I and II only * (b) II and III only (c) I and III only (d) I, II and III

# Kalai-II Hydroelectric Project

Prelims Only | Economics | Mains Paper 3: Infrastructure: Energy, Ports, Roads, Airports, Railways Etc.

## Why in the News?

The Arunachal Pradesh State Pollution Control Board (APSPCB) conducted a public hearing for the proposed 1,200 MW Kalai-II hydroelectric project in Anjaw district.

## About Kalai-II Hydroelectric Project:

- **Location**: Anjaw District, Arunachal Pradesh, on the **Lohit River** (tributary of the Brahmaputra).
- **Capacity**: 1,200 MW (six turbines of 190 MW each + one unit of 60 MW).
- **Project Type**: Run-of-river with pondage.
- **Key Features**: Concrete gravity dam, diversion tunnels, underground powerhouse, surge chamber, and tailrace tunnel.
- **Power Generation**: Estimated 4.85 TWh annually; free power worth ₹318 crore/year for the state.

- **Equity**: Arunachal Pradesh holds 26% stake.

## Strategic Importance:

- **Energy Security**: Expands India's renewable energy portfolio and hydropower capacity in the North-East.
- **Geopolitical Context**: Strengthens India's presence in the sensitive Brahmaputra basin bordering China.
- **Economic Boost**: Contributes to state revenues through free power and Local Area Development Fund (~₹2.2 crore/year).
- **Part of Larger Push**: One of 13 stalled hydropower projects in Arunachal Pradesh revived through MoAs with central PSUs, aligning with India's clean energy targets.

[UPSC 2008] On which one of the following rivers is the Tehri Hydropower Complex located?
Options: (a) Alaknanda (b) Bhagirathi *(c) Dhauliganga (d) Mandakini

# Simplified two-rate GST Structure

## Why in the News?

- The Group of Ministers (GoM) on Rate Rationalisation has accepted the Centre's proposal to simplify GST into a two-rate structure.
- The recommendation will now be placed before the GST Council for final approval.



**Current structure**
5% | 12% | 18% | 28%+cess

**Proposed New Structure**
5% | 18% | 40%*
(*demerit goods: Half a dozen goods will attract this levy)

**WHAT MAY BECOME CHEAPER**
**Most goods from 12% → 5%**
- Condensed milk, dried fruits
- Pasta, jams, namkeens
- Utensils, furniture
- Footwear under ₹1,000
- Agricultural implements

**Most goods from 28% → 18%**
- Air conditioners
- Washing machines, dishwashers
- Cement

Goods currently taxed at the **5% and 18%** rates are largely expected to remain in the same brackets

## About Goods and Services Tax (GST):

- **Nature**: Comprehensive, multi-stage, **destination-based indirect tax** on goods and services.
- **Introduction**: Launched **July 1, 2017**, via the **101st Constitutional Amendment Act, 2016**.
- **Replaced Taxes**: Subsumed excise duty, value-added tax (VAT), service tax, etc.
- **Objectives**: One Nation–One Tax, reduce cascading taxation, simplify compliance, expand tax base.
- **Structure**: Five slabs – 0%, 5%, 12%, 18%, 28%, with cess on luxury/sin goods (tobacco, cars, online gaming).
- **Exemptions**: Essential goods (food, medicines, education items) in 0% slab. Petroleum, alcohol, and electricity remain outside GST.

## Proposed Two-Rate GST Structure:

- **Reforms**: Removal of **12% and 28% slabs**; only 5% and 18% to remain.
- **Reclassification**: 99% of 12% items → 5% slab; 90% of 28% items → 18% slab.
- **New Slab**: 40% rate for demerit goods (tobacco, luxury cars, real-money gaming).
- **Cess**: Compensation cess on 28% items to end.
- **Timeline**: Implementation expected October 2025 (Diwali).

## Policy Rationale & Concerns:

- **Simplification**: From four slabs to two, easing compliance and transparency.
- **Consumption Boost**: Lower rates on daily goods to benefit households and Micro, Small and Medium Enterprises (MSMEs).
- **Compliance Gains**: Less scope for disputes, litigation, and evasion.
- **Economic Signal**: Projects confidence in domestic consumption as growth driver.
- **State Concerns**: States, including Kerala, warn of revenue loss; call for compensation mechanism.

> [UPSC 2018] Consider the following items:
> 1. Cereal grains hulled 2. Chicken eggs cooked 3. Fish processed and canned 4. Newspapers containing advertising material
> Which of the above items is/are exempted under GST (Goods and Services Tax)?
> Options: (a) 1 only (b) 2 and 3 only (c) 1, 2 and 4 only *(d) 1, 2, 3 and 4

# POLITY

## Supreme Court interventions in Civil–Criminal overlap Cases

Prelims Only | Polity | Mains Paper 2: Executive & Judiciary

### Why in the News?
In August 2025, the Supreme Court intervened twice to prevent the misuse of criminal proceedings in essentially civil disputes.

### About Civil and Criminal Cases:
- **Civil cases** involve disputes between individuals or organisations and are mostly governed by **Code of Civil Procedure, 1908** (CPC). The aim is to resolve rights and duties, usually through compensation (damages) or injunctions. Examples: property disputes, contract breaches, divorce, custody, money recovery.
- **Criminal cases** involve offences against the state or society. The objective is punishment and deterrence. Initiated by the state prosecutor. Examples: theft, cheating, assault, murder.
- **Burden of proof:**
- **Civil cases**: Decided on a preponderance of probabilities (more likely than not).
- **Criminal cases:** Guilt must be proven beyond reasonable doubt.
- **Dual Cases**: Some acts can give rise to **both civil and criminal liability**. For dual proceedings, there must be proof of criminal intent before entering the commercial or personal relationship.

- **Timelines:** Data from the **National Judicial Data Grid (2025)** shows **civil cases are slower** (avg. 4.91 years) compared to many criminal cases (70% disposed within a year).

### Recent Supreme Court Actions:
- **Rajasthan plywood dispute case (Aug 13, 2025):** SC held there was no criminal breach of trust in a simple sale transaction. Denial of pre-arrest bail by the High Court was overturned.
- **Allahabad HC case (Aug 4, 2025):** SC criticised a judge for allowing criminal proceedings in a business transaction dispute, calling it a "mockery of justice". The judge was temporarily barred from handling criminal cases, later reinstated after CJI intervention.
- The SC clarified that **civil disputes cannot be turned into criminal prosecutions** unless fraud or criminal intent is clearly shown.

> **[UPSC 2016]** With reference to the 'Gram Nyayalaya Act', which of the following statements is/are correct?
> 1. As per the Act, Gram Nyayalayas can hear only civil cases and not criminal cases.
> 2. The Act allows local social activists as mediators/reconciliators.
> Options: (a) 1 only (b) 2 only* (c) Both 1 and 2 (d) Neither 1 nor 2

## When can Courts order a Recount of Votes?

Prelims Only | Polity | Mains Paper 2: Representation Of People's Act

### Why in the News?
The Supreme Court for the very first time has recounted EVM votes on its premises and overturned a Haryana sarpanch election result.

**Legal Framework for Challenging Election Results:**
- **Parliamentary, Assembly, State Council elections**: Validity can be challenged by filing an **election petition in the High Court** of the state where the election was held.
- **Local government elections**: Petitions must be filed at **district-level civil courts**.
- **Eligibility to file**: Only a **candidate or elector** related to the election can file.
- **Timeframe**: Petition must be filed **within 45 days of result** declaration.
- **Petition requirements**:
- Must contain **concise statement of material facts**.
- Allegations of **"corrupt practices"** must include names of individuals, dates, and locations.
- **Judicial Approach**:
- SC considers corrupt practices as **quasi-criminal**, requiring **high standard of proof**.

- Vague or ambiguous petitions are dismissed.
- **Legal Basis:**
- 
- Representation of the People Act, 1951.
- State Panchayat Raj Acts.

## Grounds for Invalidating an Election:
Courts can void an election on:
- **Bribery or undue influence**, e.g., hiding criminal antecedents or promoting enmity.
- **Candidate disqualified/unqualified** on the election date.
- **Improper rejection** of nomination paper.
- **Improper acceptance of nomination** or **improper reception/rejection of votes**, if shown to **materially affect results**.
- **Non-compliance with Constitution or election laws/ rules**, if it materially impacted the outcome.

## When can Courts order Recount of Votes?
- A **recount** is a possible judicial remedy but **not granted lightly**.
- Seen as affecting **vote secrecy**, which is vital to free and fair elections.
- Courts order recounts **only if**:
- Petitioner presents **specific material facts**.
- Evidence shows a **prima facie case of probable counting error**.
- Recount is deemed **necessary for justice**.
- Normally conducted at **election location**.
- **Exception**: Panipat case, where **SC recounted votes in its own premises**.

## Can Courts declare a new Winner?
- **Rare**, but **courts can** declare a new winner if:
- Evidence shows petitioner (or another candidate) actually had **majority of valid votes**.
- Or petitioner proves they would have won **but for votes gained through corrupt practices**.
- Requires **concrete, quantifiable evidence** of tainted votes.
- **Example**: In **Feb 2024 Chandigarh mayoral election**, SC declared a new winner after:
- Presiding officer wrongly invalidated **8 paper ballots**.
- All votes had been cast for the losing candidate.
- SC restored them as valid, making the losing candidate the winner.

[UPSC 2004] Consider the following tasks:
1. Superintendence, direction and conduct of free and fair elections.
2. Preparation of electoral rolls for all elections to the Parliament, State Legislatures and the Office of the President and the Vice-President.
3. Giving recognition to political parties and allotting election symbols to political parties and individuals contesting the election.
4. Proclamation of final verdict in the case of election disputes.
Which of the above are the functions of the Election Commission of India?
Options: (a) 1, 2 and 3* (b) 2, 3 and 4 (c) 1 and 3 (d) 1, 2 and 4

# The Constitution (130th Amendment) Bill, 2025

Bills/Act/LawsPrelims Only | Polity | Mains Paper 2: Indian Constitution - historical underpinnings, evolution, features, amendments, significant provisions and basic structure

## Why in the News?
The Union Home Minister is set to introduce three bills in the Lok Sabha to provide legal framework for removal of the Prime Minister, Union Ministers, Chief Ministers and Ministers in States and UTs who are "arrested and detained in custody on account of serious criminal charges."

## Which are the three Bills?
1. **130th Constitutional Amendment Bill, 2025** (discussed below)
2. **Jammu and Kashmir Reorganisation (Amendment) Bill, 2025** – Provides clarity on removal of CM and Ministers in J&K.
3. **Government of Union Territories (Amendment) Bill, 2025** – Defines similar provisions for Puducherry and other UTs.

## About the 130th Constitutional Amendment Bill, 2025:
- **Scope**: Applies to Prime Minister, Chief Ministers, and Ministers at Union, State, and Union Territory levels.
- **Grounds for Removal**: Arrest and detention for **30 consecutive days** for an offense punishable by **five years or more**.
- **Reappointment**: Possible after release from custody.
- **Objective**: Prevent prolonged tenure of arrested leaders in office (e.g., recent case involving Delhi CM Arvind Kejriwal).

## Amendments proposed to the following Articles:

## Rationale and Significance:
- At present, the Constitution has **no provision** for automatic removal of ministers in custody.
- Bill ensures that **office bearers uphold public trust** and do not undermine governance during detention.
- The statement of objects emphasized that **elected representatives must rise above political interests** and maintain conduct beyond suspicion.

- Promotes **integrity of democracy** by aligning ministerial positions with **constitutional morality and accountability**.

|  | Current Provision | Limitation | Changes Proposed |
|---|---|---|---|
| **Article 75 (Union – PM & Union Ministers)** | PM appointed by President; Ministers appointed on PM's advice. They hold office **during the pleasure of the President**. Removal is political (loss of confidence, resignation, dismissal). | No explicit mechanism to remove PM/Ministers if detained/arrested for long periods. | **New provision:** If PM or any Union Minister is detained in custody for **30 consecutive days** for a serious offense (≥5 years punishment), they must resign by 31st day or automatically **cease to hold office**. They may be reappointed after release. |
| **Article 164 (States – CM & State Ministers)** | CM appointed by Governor; Ministers appointed on CM's advice. They hold office **during the pleasure of the Governor**. Council of Ministers collectively responsible to State Assembly. | No clear rule for automatic removal if CM/Ministers remain in custody. | **Similar to Union level:** If CM or Minister is detained in custody for **30 consecutive days** under serious charges (≥5 years punishment), they automatically lose office. Reappointment allowed after release. |
| **Article 239AA (Union Territory of Delhi – CM & Ministers)** | Special status for Delhi (NCT). CM and Council of Ministers aid & advise LG. They hold office as per political responsibility to the Assembly. | No explicit provision for automatic removal on detention. | **A new Section 5A to be inserted:** CM/Ministers of NCT of Delhi cease office if detained for **30 days** under serious charges (≥5 years). Reappointment possible after release. |

# Sedition Redux: On trampling on press freedom

Explained | Polity | Mains Paper 2: Indian Constitution - historical underpinnings, evolution, features, amendments, significant provisions and basic structure

## Why in the News?

On August 12, 2025, The Wire's editors Siddharth Varadarajan and Karan Thapar were summoned by the Assam Police under Section 152 of the BNS, even as the Supreme Court had that very day issued protection while examining the constitutional validity of the new sedition law. This open defiance of judicial authority and the use of procedurally defective summons marks a serious blow to press freedom. What makes this moment significant is that the law being challenged is wider and harsher than colonial sedition provisions, despite India claiming to have moved away from such colonial baggage.

## Introduction

The sedition debate in India has returned in a new form.

While Section 124A IPC was suspended in 2022, the government introduced **Section 152 of the BNS,** which critics say is "**sedition by another name**." The law widens state powers and lowers the threshold for prosecution, making legitimate criticism vulnerable to criminalisation. Recent cases against journalists show how easily this provision can be misused.

## Section 152 and Its Differences from the Old Sedition Law

- **Expanded scope**: Goes beyond "disaffection" against government, criminalising acts deemed to endanger sovereignty, unity, and integrity.
- **Lower bar for prosecution**: Words like "knowingly" dilute intent requirements; mere criticism can be dragged into criminality.
- **Colonial continuity**: Despite being marketed as decolonisation, Section 152 retains the same suppressive essence as 124A IPC.

## The Wire Case and Procedural Violations

- **Summons despite SC protection**: Assam Police issued notices on the very day of SC's order, reflecting executive defiance.
- **Lack of transparency**: Summons omitted FIR dates, details of offence, and copies of FIR, **violating BNSS safeguards**.
- **Political overtones**: Linked to The Wire's report on Operation Sindoor, raising concerns of **vendetta-driven policing**.

## Threats to Press Freedom

- **Chilling effect**: Journalists may self-censor for fear of harassment.
- **Vague definitions**: Broad terms like "**unity" and "sovereignty**" give unchecked power to authorities.
- **Targeting dissent**: Questioning government policy risks being equated with undermining national integrity.

## Judicial Response and Challenges

- **Supreme Court scrutiny**: SC is examining the constitutional validity of Section 152.
- **Precedent of 2022**: Earlier suspension of sedition cases showed judicial recognition of misuse.
- **Executive overreach**: Assam Police's defiance underlines the need for stronger judicial safeguards and guidelines.

## Broader Democratic Implications

- **Freedom of expression at stake**: Democracy thrives on criticism; silencing it weakens accountability.
- **Comparative perspective**: **UK** repealed sedition in 2009; **US** limits it only to **violent overthrow.**
- **Governance paradox**: Instead of transparency, India risks sliding into a **majoritarian security state.**

## Way Forward

- **Clear legislative safeguards**: Narrow the scope of Section 152 with precise definitions of terms like "unity" and "sovereignty" to prevent misuse.
- **Judicial guidelines**: The Supreme Court can lay down **binding principles (on the lines of Kedar Nath Singh and Shreya Singhal)** that limit sedition to cases of direct incitement to violence or armed rebellion
- **Independent oversight**: A judicial or quasi-judicial body should vet sedition cases before FIR registration, reducing frivolous prosecutions.
- **Strengthening press freedom**: Institutional mechanisms like a **Media Commission** or independent ombudsman can address grievances without criminalisation.
- **Comparative best practices**: India can draw from the **UK model of repeal and the US model of narrow application**, balancing national security with democratic freedoms.
- **Civic education**: Promoting awareness among citizens, journalists, and law enforcement about constitutional morality and reasonable restrictions can ensure a culture of restraint and accountability.

## Conclusion

Section 152 represents the persistence of colonial-style suppression under a new name. Unless the judiciary firmly strikes it down or introduces robust safeguards, it will continue to erode press freedom and democratic dissent, pillars without which India's constitutional promise cannot stand strong.

## Value Addition

## Constitutional Angle

- Article 19(1)(a): Freedom of speech.
- Article 19(2): Reasonable restrictions (sovereignty, unity, public order, etc.).
- Basic Structure Doctrine: Democracy, liberty, and rule of law as inviolable.

## Judicial Precedents

- **Kedar Nath Singh vs State of Bihar (1962):** Sedition valid only when incitement to violence/public disorder is proven.
- **Shreya Singhal vs Union of India (2015):** Vague terms in laws (like IT Act Section 66A) struck down for chilling free speech.
- **SC Order 2022**: Suspended all 124A cases, acknowledging misuse.

## Reports & Perspectives

- **Law Commission of India (2018):** Recommended clearer safeguards; questioned necessity of sedition.
- **Global practices**: UK repealed sedition; US restricts it narrowly.
- **BNSS debate**: Marketed as decolonisation but seen as repackaging colonial control.

## Mapping Microthemes

- **GS Paper II:** Freedom of speech, judiciary, Centre-State federalism
- **GS Paper III:** Internal security vs. dissent.
- **GS Paper IV:** Misuse of power, ethics in public life, constitutional morality.

PYQ Relevance
**[UPSC 2014]** What do you understand by the concept "freedom of speech and expression"? Does it cover hate speech also? Why do the films in India stand on a slightly different plane from other forms of expression? Discuss.

*Linkage:* The 2014 question on freedom of speech, hate speech, and films mirrors today's debate on Section 152. Just as films face stricter scrutiny due to mass impact, the new sedition law risks wrongly placing legitimate criticism and dissent in the same bracket as hate speech or violent incitement. This makes the boundary of free expression a central issue in both contexts.

# [21st August 2025] The Hindu Op-ed: India's democracy is failing the migrant citizen

> **PYQ Relevance**
> **[UPSC 2022]** Discuss the role of the Election Commission of India in the light of the evolution of the Model Code of Conduct."
>
> *Linkage*: Just as the Model Code of Conduct (MCC) evolved as a tool by the Election Commission of India (ECI) to ensure free and fair elections in a changing political landscape, the present crisis of migrant disenfranchisement in Bihar shows the need for the ECI to evolve its mechanisms to safeguard inclusivity similarly. The deletion of 3.5 million migrant voters highlights that electoral integrity today is not only about regulating political behaviour (through MCC) but also about ensuring universal participation by adapting to realities of circular migration, dual belonging, and portable identities. Strengthening ECI's role in creating mobile and flexible voter registration systems, like Kerala's migration surveys or cross-State verification, would be a natural extension of its democratic mandate.

## Mentor's Comment

The article highlights a **silent but serious crisis** unfolding in Bihar, where nearly **3.5 million voters**, largely migrants, have been deleted from electoral rolls due to the **Special Intensive Revision (SIR).** This not only exposes flaws in **India's electoral infrastructure** but also deepens the democratic deficit in migrant-heavy States. For UPSC aspirants, this issue links to democracy, citizenship, federalism, migration, and social justice, making it highly relevant for GS 2 (Polity & Governance) and GS 1 (Society).

## Introduction

**In a democracy of 1.4 billion citizens, every vote matters**. Yet, millions of India's migrant workers are quietly being left out of the democratic process. In Bihar, where **migration is both an economic lifeline and a survival strategy**, the recent mass deletion of 3.5 million voters (4.4% of the total electoral roll) raises critical questions about **representation, inclusivity, and the design of India's electoral system.** The crisis is not an isolated administrative lapse but a **systemic failure rooted in an outdated model of citizenship** tied to permanent residence, ignoring the realities of circular and seasonal migration.

## The disenfranchisement of Bihar's migrants in the news

1. **Mass deletion**: Nearly 3.5 million voters were deleted under the Special Intensive Revision (SIR).
2. **Reason given**: "Permanently migrated", migrants absent during house-to-house verification.
3. **Permanent loss of rights**: These voters cannot vote either in host States (where they work) or in home States (where their names are deleted).
4. **Democratic rupture**: Bihar's voter turnout is already low, **53.2%** in the last four Assembly elections, compared to **66.4% in Gujarat and 70.7% in Karnataka**.
5. **Scale of migration**: **7 million** annual outflow from Bihar, of which **4.8 million** migrate seasonally. Around **2.7 million** return during October–November festivals, yet many will be unable to vote this year.

## Electoral system and the migrant challenge in India

1. **Sedentary citizen model**: Voter registration **tied to proof of residence** and **in-person verification.**
2. **Documentation barriers**: Migrants often live in rented rooms, construction sites, or slums with no accepted address proof.
3. **Regionalism & exclusion**: Migrants in host States are seen as "outsiders" with fears of electoral influence discouraging registration.
4. **Dual belonging demonised**: Migrants contribute economically in host States but are denied political identity both at origin and destination.

## Studies revealing migrant exclusion in electoral participation

1. **TISS Study (2015):** "Inclusive Elections in India" (funded by ECI) confirmed marginalisation of migrants.
2. **Triple burden**: **Administrative barriers, digital illiteracy, social exclusion**.
3. **Correlation**: Higher migration = Lower voter turnout in source States.
4. **Mobile data estimates**: **7 million circular migrants** annually from Bihar, proving large-scale exclusion.

## Welfare exclusions and the migrant voting crisis

- **One Nation One Ration Card Scheme (2019):**
    1. **Limited uptake**: only **3.3 lakh households** from Bihar availed portability by May 2025.
    2. **Barriers**: Dual residency, bureaucratic hurdles, fear of losing entitlements.
    3. **Parallel with voter IDs**: migrants keep **origin-based documents** for security.
1. **Cross-border complexities**: Along the **1,751 km India-Nepal border**, traditional "roti-beti" ties now face exclusion due to restrictive documentation, disproportionately affecting women.

## Reforms to safeguard migrant voting rights

1. **Portable voter identity**: Mobile, flexible, and portable voter ID system.
2. **Cross-verification model**: Coordination between origin and destination States to prevent disenfranchisement.
3. **Local bodies' role**: Panchayats and civil society to aid migrant re-registration.
4. **Kerala model of migration surveys**: Replicate in high-migration States like Bihar and UP.
5. **Immediate halt to blanket deletions**: Safeguard

against the "largest silent voter purge in post-Independence India."

## Conclusion
Migrants embody **India's paradox, economic backbone but political invisibility**. The deletion of millions of voters from Bihar is not just an **administrative failure**; it is a **systemic denial of democratic rights.** If India's electoral infrastructure does not adapt to the realities of migration, democracy risks leaving behind its most hard-working and vulnerable citizens. Ensuring portable electoral rights is not charity, it is the **essence of a living democracy**.

## Value Addition

## Constitutional and Legal Angle
- **Article 326**: Provides for **universal adult suffrage** — any exclusion of migrant workers undermines this fundamental principle.
- **Representation of People Act, 1950 & 1951**: While they govern electoral rolls and voting procedures, they are **silent on portable voting rights for internal migrants**.
- **Supreme Court in PUCL vs Union of India (2003):** Declared the **right to vote as part of freedom of expression under Article 19(1)(a).** Denial to migrants raises constitutional concerns.

## Scale of the Problem – National Context
- **Census 2011**: 45.6 crore internal migrants in India (37% of the population).
- **Economic Survey 2017**: ~9 million people migrate annually for work, education, or marriage.
- Migrants form a huge electoral constituency, yet remain politically invisible.

## Policy/Election Commission (EC) Initiatives Beyond Bihar
- **EC's Remote Voting Machine (RVM) Proposal, 2023:** Aimed to allow migrants to vote from remote locations, but postponed after opposition from political parties.
- **E-EPIC (Electronic Voter Photo ID Card), 2021**: Step toward portability but lacks full integration across States.

## Comparative Global Insights
- **Philippines**: Overseas absentee voting law enables migrants abroad to vote in national elections.
- **Mexico**: Postal voting rights for citizens abroad.
- **South Africa**: Mobile registration and voting stations in migrant-dense areas.
- India lags in creating portable political rights for its massive migrant population.

## Democratic & Governance Implications
- **Political alienation** → weakens democratic legitimacy in migrant-heavy States (Bihar, UP, Odisha).
- **Rise of sub-nationalism** → exclusion in host States deepens identity politics.
- **Urban governance**: Migrants in cities are tax contributors (indirectly via consumption) but lack political representation → urban policies ignore their needs.

## Ethical & Social Justice Dimension
- **Ambedkar's warning**: "**Political democracy cannot last unless… social democracy is its foundation**." Excluding the poor migrants fractures this balance.
- **Gandhian perspective**: **True Swaraj is when "the last man" (Antyodaya principle) participates in democracy** — migrant exclusion violates this ethic.

## Mapping Microthemes
- **GS Paper I (Society):** Migration, regionalism, exclusion of vulnerable groups.
- **GS Paper II (Polity & Governance):** Electoral reforms, federal coordination, democratic rights.
- **GS Paper III (Economy):** Migration as economic survival strategy.
- **GS Paper IV (Ethics):** Justice, fairness, and democratic inclusivity.

# INTERNATIONAL RELATIONS

## Russia's Sale of Alaska to US

world map | International Relations | Mains Paper 2: Effect Of Policies & Politics Of World On India'S Interests

### Why in the News?
United States President Donald Trump and his Russian counterpart Vladimir Putin are set to meet in Anchorage, Alaska to discuss how to end the war in Ukraine.



### About Alaska:
- **Acquisition**: Largest U.S. state; Purchased from Russia in **1867** for **$7.2 million**.
- **Mountains**: Includes Alaska Range with **Mount Denali** (20,310 ft), the highest peak in North America.
- **Geography**: Brooks Range separates central Alaska from the Arctic far north.
- **Tundra**: Northern regions feature vast **tundra**, **permafrost**, and **Arctic coastal plains**.
- **Glaciers**: Hosts **100,000+ glaciers**, including **Bering Glacier**, the **largest in North America**.
- **Forests**: About **5% glacier ice**, with extensive boreal and temperate rainforests in the south.

- **Volcanoes**: More than **70 active volcanoes** in Aleutians and Alaska Peninsula.
- **Seismic Activity**: Located on the **circum-Pacific seismic belt**, prone to powerful quakes (e.g., 1964 Alaska earthquake).
- **Water Resources**: Contains **3 million+ lakes** and **3,000+ rivers**, among the most water-rich regions globally.
- **Peninsulas**: Includes **Alaska** Peninsula, **Kenai** Peninsula, and **Seward** Peninsula (linked to ancient Bering land bridge).

### Why did Russia sell Alaska to the US?
- After the **Crimean War (1853–56)**, Russia was financially strained and needed funds.
- Alaska was seen as a **remote, unprofitable liability** with declining fur trade.
- Russia feared **Britain might seize Alaska** easily from nearby Canada in a future war.
- Selling it to the **United States ensured goodwill** and balanced British power.
- The **$7.2 million sale (1867)** turned a weakly defended outpost into cash for reforms.

### Geopolitical Significance of Alaska:
- **Natural Resources**: Rich in oil, gas (e.g., Prudhoe Bay discovery, 1968), fisheries, and minerals vital for U.S. energy security.
- **Shipping Routes**: Offers access to Arctic Sea routes, increasingly navigable due to climate change.
- **Strategic Gateway**: Provides access to the Arctic and Pacific, enhancing U.S. naval and air capabilities.
- **Defense Value**: Proximity to Russia made it critical in the Cold War and remains vital in Arctic competition.
- **Military Presence**: Hosts major U.S. bases and radar systems for missile defense and surveillance.
- **Arctic Council Role**: Strengthens U.S. claims in polar governance and Arctic Council negotiations.
- **Scientific Hub**: Serves as a center for climate, seismic, and polar ecosystem research.

[UPSC 2025] Consider the following statements:
I. Anadyr in Siberia and Nome in Alaska are a few kilometers from each other, but when people are waking up and getting set for breakfast in these cities, it would be different days.
II. When it is Monday in Anadyr, it is Tuesday in Nome.
Which of the statements given above is/are correct?
(a) I only * (b) II only (c) Both I and II (d) Neither I nor II

# In news: International Criminal Court (ICC)

## Why in the News?
The Trump administration sanctioned judges and prosecutors of the International Criminal Court (ICC) over arrest cases involving Israeli leaders and past probes into U.S. officials.

## About the International Criminal Court (ICC):
- **Established:** 2002 under the **Rome Statute (1998)**; headquartered at **The Hague, Netherlands**.
- **Nature:** First **permanent international court** to try individuals for grave crimes.
- **Jurisdiction** over **4 core crimes:**
1. Genocide
2. Crimes against humanity
3. War crimes
4. Crime of aggression
- **Members:** 124 States Parties
- **NON-members:** India, China, USA, Russia, Israel, Ukraine
- **Structure:**
- **Office of the Prosecutor** – investigates and prosecutes cases.
- **18 Judges** – elected for 9 years.
- **Assembly of States Parties** – governs ICC administration.
- **Trust Fund for Victims**, **Detention Centre**
- **Languages:** English, French, Arabic, Chinese, Russian, Spanish
- **Funding:** Annual budget (2025) ~ €195 million (mostly from member states)

## Jurisdiction and Reach of an ICC Warrant:
- **Applicability:**
- Crimes by nationals of **member states**
- Crimes **committed on member state territory**
- **UNSC referrals** can extend jurisdiction to non-member states (e.g., Libya, Darfur)
- **Obligations on States:**
- Member states must **execute arrest warrants** and cooperate fully.
- Non-compliance can be reported to **Assembly of States Parties** or **UN Security Council** (for UNSC referrals)
- **Challenges:**
- ICC lacks an **independent enforcement mechanism**
- **Non-members** (e.g., US, Russia) are **not bound** to cooperate
- **Political and diplomatic constraints** hinder the execution of warrants
- **Special Mechanisms:** ICC established an **Arrest Working Group (2016)** to enhance warrant enforcement through better intelligence-sharing.

> **[UPSC 2022]** Which one of the following statements best reflects the issue with Senkaku Islands, sometimes mentioned in the news ?
> Options:
> (a) It is generally believed that they are artificial islands made by a country around South China Sea.
> (b) China and Japan engage in maritime disputes over these islands in East China Sea. *
> (c) A permanent American military base has been set up there to help Taiwan to increase its defence capabilities.
> (d) Though International Court of Justice declared them as no man's land, some South-East Asian countries claim them.

# Xinjiang-Xizang Railway Line

## Why in the News?
China has launched the Xinjiang–Xizang Railway Line, a strategic, economic, and engineering milestone, connecting Xinjiang with Tibet.

## About the Xinjiang–Xizang Railway Line:
- **Overview:** A major high-altitude railway project connecting **Hotan in Xinjiang** to **Shigatse and Lhasa in Tibet (Xizang)**.
- **Total length** planned: **~2,000 km**, part of China's larger **5,000 km rail grid in Tibet** by 2035.
- **Construction is phased**:
- Shigatse–Pakhuktso section (by 2025)
- Pakhuktso–Hotan section (by 2035).
- **Terrain:** Himalayas, Karakoram, Kunlun ranges, deserts, glaciers, and permafrost — average altitude above 4,500m.
- **Significance**: Seen as one of China's most advanced and difficult transport projects, comparable to the **Qinghai–Tibet Railway (2006)**.

## Strategic Implications of the Project:
- **Military Mobility:** Proximity to Aksai Chin and **Line of Actual Control (LAC)** enhances Chinese troop deployment and logistics capabilities.
- **Regional Integration:** Links Xinjiang (Uyghur region) and Tibet (Buddhist region) with mainland China,

supporting **Sinicisation and demographic shifts**.

- **Economic Role:** Opens remote high-altitude areas to trade, energy transport, and tourism, reducing isolation of minority regions.
- **Political Control:** Strengthens Beijing's hold over **restive border provinces** and suppresses separatist tendencies.
- **India Factor:** Raises security concerns as India is also upgrading border infrastructure post-2020 **Galwan clash**.
- **Part of "Go West Strategy" (2000):** Long-term plan to develop western provinces with infrastructure and integrate them into China's national economy.

[UPSC 2023] With reference to India's projects on connectivity, consider the following statements :
1. East-West Corridor under Golden Quadrilateral Project connects Dibrugarh and Surat.
2. Trilateral Highway connects Moreh in Manipur and Chiang Mai in Thailand via Myanmar.
3. Bangladesh-China -India -Myanmar Economic Corridor connects Varanasi in Uttar Pradesh with Kunming in China. How many of the above statements are correct?
Options: (a) Only one (b) Only two (c) All three (d) None*

# SOCIAL JUSTICE

## [pib] "Anna-Chakra" Supply Chain Optimisation Tool for PDS

PIBPrelims Only | Social Justice | Mains Paper 2: Laws, Institutions & Bodies Constituted For The Vulnerable Sections

### Why in the News?
The Union Minister of State for the Ministry of Consumer Affairs, Food and Public Distribution has provided crucial information regarding the Anna-Chakra Tool to the Parliament.

### About Anna-Chakra:
- **Purpose**: Digital tool to optimise supply chain of the Public Distribution System (PDS).
- **Developed by**: World Food Programme (WFP) and Foundation for Innovation and Technology Transfer (IIT-Delhi).
- **Implementation**: Adopted in **30 States/UTs**, except Manipur.
- **Coverage**: Supports **4.37 lakh Fair Price Shops** and **6,700 warehouses**.
- **Savings**: Reduces logistics/fuel costs, saving about **₹250 crore annually**.
- **Environmental Impact**: Route optimisation reduces travel distance by **15–50%**, cutting **$CO_2$ emissions**.

### Back2Basics: Public Distribution System (PDS) in India:
- **Objective**: Provides **subsidised food grains** to poor households, ensuring food security.

- **History**: Originated in inter-war years; expanded after **1960s food shortages**.
- **Reforms**: **Revamped PDS (1992)** extended coverage to rural and poverty-prone areas.
- **Structure**:
- **Centre (FCI)** – procurement, storage, transportation, bulk allocation.
- **States** – distribute food grains to families via Fair Price Shops.
- **Coverage**: Serves **~800 million people** through **5 lakh+ Fair Price Shops**.
- **Items Distributed**: Wheat, rice, sugar, kerosene; some states add pulses and oils.
- **Significance**: Shields poor households from food price shocks and economic distress.

[UPSC 2008] Consider the following statements:
1. Regarding the procurement of food grains, Government of India follows a procurement target rather than an open-ended procurement policy.
2. Government of India announces minimum support prices only for cereals.
3. For distribution under Targeted Public Distribution System (TPDS), wheat and rice are issued by the Government of India at uniform Central issue prices to the States/Union Territories.
Which of the statements given above is/are correct?"
Options: (a) 1 and 2 (b) 2 only (c) 1 and 3* (d) 3 only

# Punishing process: On gender identity recognition

## Introduction

The recognition of gender identity in India rests on strong legal foundations, the NALSA v. Union of India (2014) judgment and the Transgender Persons (Protection of Rights) Act, 2019. Yet, lived realities remain different, as shown in the Manipur High Court order directing fresh academic certificates for **Dr. Beoncy Laishram.** What should have been a routine correction instead became a legal battle, exposing the **gap between law and practice**.

## Why is this issue in the news?

The Manipur High Court directed the State to issue fresh academic certificates to Dr. Beoncy Laishram, a transgender doctor, after her university refused to update her records citing procedural hurdles. This is significant because it highlights how basic rights, already guaranteed by law, are still denied in practice. The case reflects a larger systemic problem where bureaucratic rigidity overrides constitutional guarantees under Articles 14 and 21, forcing transpersons into prolonged legal battles to claim what is already legally theirs.

## Bureaucratic Inertia vs. Transgender Justice

1.  **Administrative inertia**: Officials often defer to rigid procedural rules rather than the spirit of the law.
2.  **Sequential corrections**: Universities and boards insisted that records must be corrected starting from the earliest certificate, creating cascading hurdles.
3.  **Binary mindset**: Authorities still stick to birth-assigned gender over self-identity.

## The NALSA Judgement Mandate on Self-Identification

1.  **Right to self-identify**: In NALSA v. Union of India (2014), the Supreme Court recognised **transgender persons' right to self-identify their gender**.
2.  **Welfare entitlements**: Declared them socially and educationally backward, eligible for reservations and welfare schemes.
3.  **Constitutional backing**: Linked to Articles 14 (equality before law) and 21 (right to life and dignity), making recognition a constitutional obligation.

## Statutory Guarantees under the Transgender Persons (Protection of Rights) Act, 2019

1.  **Statutory obligation**: Authorities are legally required to recognise self-identified gender and update official records.
2.  **Codification of self-identification**: Law translated the NALSA principle into binding statutory practice.
3.  **Gap in implementation**: Despite clarity in law, officials often refuse compliance unless compelled by courts.

## The Precedent of Dr. Laishram's Case (A Landmark for Institutional Accountability)

1.  **Individual justice**: The order ensures her academic and professional records reflect her affirmed identity.
2.  **Precedential value**: Signals to other institutions that **procedural rigidity cannot override constitutional rights.**
3.  **Systemic spotlight**: Reveals how transpersons are forced into legal struggles for routine matters, expending time and resources disproportionately.

## Reforms for Bridging Law and Reality

1.  **Institutional reform**: Simplify procedures and enforce compliance through clear administrative circulars.
2.  **Cultural change**: Bureaucracy must embrace gender as lived reality, not paperwork.
3.  **Awareness and sensitivity training**: Officials must be sensitised to constitutional principles and human dignity.

## Conclusion

The Manipur High Court's ruling is a milestone, but it also highlights how **rights guaranteed in law often falter in practice**. True empowerment will come only when institutions operationalise constitutional principles with sensitivity, ensuring that gender identity is recognised as a matter of dignity, not just paperwork.

## Value Addition
## Key Features of the Transgender Persons (Protection of Rights) Act, 2019

- **Definition of Transgender Person**: Includes trans-men, trans-women, persons with intersex variations, gender-queer, and persons with socio-cultural identities (like hijra, aravani, jogta).
- **Right to Self-Perceived Gender Identity:** Allows individuals to identify as male, female, or transgender.
- **Prohibition of Discrimination**: No discrimination in education, employment, healthcare, housing, access to services, or public places.
- **Recognition and Certificates**: Provides for a certificate of identity issued by the District Magistrate, recognising a person as "transgender."
- **Welfare Measures**: Mandates governments to frame welfare schemes for education, healthcare, vocational training, and social security.
- **Offences and Penalties**: Criminalises denial of services, removal from household, physical/sexual abuse; punishable with imprisonment (6 months–2 years) and fine.
- **National Council for Transgender Persons (NCT)**: Advisory body to monitor implementation, headed by Union Minister for Social Justice & Empowerment.

## Criticisms

- **Certification process**: Seen as bureaucratic and violating the spirit of self-identification under NALSA (2014)
- **No reservation policy**: Act does not clearly guarantee reservations in jobs/education despite Supreme Court directions.
- **Weak enforcement**: Implementation depends heavily on state-level rules; lack of accountability mechanisms.

## International Value Addition
- **Argentina's Gender Identity Law (2012)**: Considered the most progressive globally; allows self-declared gender without medical/psychological proof.
- **Nepal (2007):** One of the first Asian countries to legally recognise a "third gender" category.
- **Yogyakarta Principles**: International guidelines on sexual orientation and gender identity as human rights.

## Reports & Data
- **National Human Rights Commission (NHRC) Report, 2017** – Found that over 92% of transpersons are denied basic rights like jobs, healthcare, education.
- **Transgender Persons (Protection of Rights) Rules, 2020** – Prescribed simple process for self-identification, but implementation is patchy.

## Governance & Ethics Lens
- **Administrative Sensitisation**: Training needed to reduce "file-based rigidity" and promote human dignity.
- **Constitutional Morality vs. Social Morality**: Governance must align with constitutional principles rather than prevailing biases.

## Mapping Microthemes
- **GS Paper I:** Social empowerment, issues faced by vulnerable sections.
- **GS Paper II:** Constitutional provisions (Articles 14, 21), governance issues, judicial interventions.
- **GS Paper IV:** Ethics in governance, dignity, empathy, sensitivity in administration.

PYQ Relevance
**[UPSC 2017]** Does the Rights of Persons with Disabilities Act, 2016 ensure effective mechanisms for empowerment and inclusion of the intended beneficiaries in the society? Discuss.
**Linkage:** Just as UPSC asked in 2017 about whether the Rights of Persons with Disabilities Act, 2016 ensures real empowerment, a similar question can be framed on the Transgender Persons (Protection of Rights) Act, 2019. Both laws highlight that while statutory recognition exists, bureaucratic inertia and weak implementation dilute inclusion, making judicial intervention critical for the intended beneficiaries**.**

# ENVIRO & BIODIVERSITY

# New Palm Species 'Phoenix roxburghii' discovered

Species | Enviro & Biodiversity | Mains Paper 3: Conservation, Environmental Pollution & Degradation, Eia

## Why in the News?
A palm specie 'Phoenix roxburghii' first described in the 17th-century botanical treatise Hortus Malabaricus has been recently confirmed.

## About Phoenix roxburghii:
- **Origin**: Named after **William Roxburgh**, regarded as the father of Indian Botany.
- **Distribution**: Found along **India's eastern coast, Bangladesh, Gujarat, Rajasthan, and Pakistan**.
- **Height**: Grows up to **12–16 metres**, taller than Phoenix sylvestris.
- **Distinct Features**:
- Solitary trunk
- Larger leaves and leaflets
- Musty-scented staminate flowers
- Large, obovoid orange-yellow fruits

## Back2Basics: India's Oil Palm Scenario
- **National Mission on Edible Oils – Oil Palm (NMEO-OP) (2021)**: Centrally sponsored, aims to boost **domestic crude palm oil (CPO)** production and reduce import dependence.
- **Targets**:
- Expand area to **10 lakh ha by 2025–26**.
- Raise production from **0.27 lakh tonnes (2019–20)** to **11.2 lakh tonnes (2025–26)**, further to **28 lakh tonnes (2029–30)**.
- **Support Mechanisms**: Viability Price (VP), Direct Benefit Transfer (DBT), planting subsidy (₹29,000/ha), and special aid for NE & Andaman regions.
- **Cultivation States**: Andhra Pradesh, Telangana, and Kerala (98% of output); others include Karnataka, Tamil Nadu, Odisha, Gujarat, and NE states.
- **Potential vs Current**: 28 lakh ha potential; only **3.7 lakh ha cultivated**.
- **Imports**: India is the **world's largest palm oil importer** (9.2 million tonnes in 2023–24). Palm oil forms **60% of edible oil imports**, sourced mainly from Indonesia, Malaysia, and Thailand.

- **Unique Advantage**: Palm oil yields are **5× higher** than traditional oilseeds.

# How does plastic pollution affect health?

Explained | Enviro & Biodiversity | Mains Paper 3: Conservation, Environmental Pollution & Degradation, Eia

## Introduction

Plastic pollution represents one of the **gravest environmental crises** of our times. Despite decades of regulation and bans, plastics remain **ubiquitous, cheap, and nearly indestructible**. Talks in Geneva involving 180 countries failed to secure an internationally binding legal agreement to limit plastic pollution, reflecting deep divisions over whether the treaty should target waste alone or include production.

## Global Plastic Treaty Deadlock: Why It Matters

- **Global deadlock**: 180 countries failed to agree on a binding treaty on plastic pollution in Geneva, despite a **UNEP-backed resolution** already in place.
- **First-time sharp focus on health**: Unlike earlier discussions centred only on waste management, the health impact of plastics is now central.
- **Scale of problem**: Plastics contain more than **16,000 chemicals**, with little knowledge on 10,000+ of them. A Nature study showed 4,000 chemicals of concern are present across major plastic types.
- **Striking evidence**: **Microplastics** detected in blood, breast milk, placenta, bone marrow, bringing urgency to the debate.

## The Persistence and Ubiquity of Plastics

1. **Symbol of consumption economy**: Cheap and versatile, plastics reflect today's global consumption.
2. **Persistence and flexibility**: Synthetic, fossil-fuel-derived polymers are non-biodegradable and endure for decades.
3. **Waste mismanagement**: Cheap production, ubiquity, and limited recycling capacity turn plastics into the prime source of litter.

## Plastics and Human Health: Emerging Evidence

1. **Chemicals of concern**: Plastics use **ethylene, propylene, styrene derivatives**, along with **bisphenols, phthalates, PCBs, PBDEs, and PFAS**.
2. **Products of exposure**: Found in food containers, bottles, teething toys, polyester, IV bags, cosmetics, paints, electronics, adhesives.
3. Health links: Studies link plastic chemicals to **thyroid dysfunction, hypertension, kidney/testicular cancer, gestational diabetes**.
4. **Evidence base**: Around 1,100 studies, involving 1.1 million individuals, compiled by Boston College & Minderoo Foundation dashboard.
5. **Nature of studies**: Mostly associative; longitudinal studies (gold standard) are still underway.

## The Microplastic Menace

1. **Definition**: Plastics smaller than 5 mm, found in additives or broken-down products.
2. **Recent discoveries**: Detected in human blood, breast milk, placenta, bone marrow.
3. **Health uncertainty**: Exact impacts still under study, but linked to multiple disorders.

## Policy Responses: Global and Indian Perspectives

- **Global scene**: Negotiations divided on waste vs production; developing countries demand funding support.
- **India's stance:**
- Ban on single-use plastics in ~20 States
- Administrative push for Extended Producer Responsibility (EPR)
- Views plastics as a waste management issue, not a health issue.
- Prefers health dimension to be dealt with at WHO, not in the plastics treaty.

## Conclusion

The Geneva deadlock reflects not just a failure of diplomacy but the widening gap between scientific evidence and policy action. Plastics are no longer an invisible convenience; they are a **pervasive health hazard**. While India treats plastics as a waste issue, ignoring health risks leaves a blind spot in policy. A robust, binding treaty addressing both production and health impact is indispensable if the world is to prevent plastics from becoming the new tobacco of the 21st century.

**[UPSC 2023]** What is oil pollution? What are its impacts on the marine ecosystem? In what way is oil pollution particularly harmful for a country like India?
**Linkage:** Since UPSC has already asked about oil pollution (2023), it shows the exam's focus on pollution and ecosystem impacts. Plastic pollution, like oil, originates from fossil fuels and has severe effects on marine life and human health. Hence, a direct question on plastic pollution and its health–environment nexus is highly probable.

## Practice Mains Question

Plastics are no longer merely a waste management problem but a serious health hazard. Critically examine the health risks associated with plastic use and evaluate India's stance in global plastic treaty negotiations.

## Mapping Microthemes

- GS-1: Impact of industrialisation and consumerism on environment.
- GS-2: International negotiations, India's foreign policy stance in environmental treaties.
- GS-3: Pollution, waste management, health-environment nexus.
- GS-4: Ethics of sustainability, intergenerational justice, corporate responsibility.

# How does plastic pollution affect health?

Explained | Enviro & Biodiversity | Mains Paper 3: Conservation, Environmental Pollution & Degradation, Eia

## Introduction

Plastic pollution represents one of the **gravest environmental crises** of our times. Despite decades of regulation and bans, plastics remain **ubiquitous, cheap, and nearly indestructible**. Talks in Geneva involving 180 countries failed to secure an internationally binding legal agreement to limit plastic pollution, reflecting deep divisions over whether the treaty should target waste alone or include production.

## Global Plastic Treaty Deadlock: Why It Matters

- **Global deadlock**: 180 countries failed to agree on a binding treaty on plastic pollution in Geneva, despite a **UN-EP-backed resolution** already in place.
- **First-time sharp focus on health**: Unlike earlier discussions centred only on waste management, the health impact of plastics is now central.
- **Scale of problem**: Plastics contain more than **16,000 chemicals**, with little knowledge on 10,000+ of them. A Nature study showed 4,000 chemicals of concern are present across major plastic types.
- **Striking evidence**: **Microplastics** detected in blood, breast milk, placenta, bone marrow, bringing urgency to the debate.

## The Persistence and Ubiquity of Plastics

1. **Symbol of consumption economy**: Cheap and versatile, plastics reflect today's global consumption.
2. **Persistence and flexibility**: Synthetic, fossil-fuel-derived polymers are non-biodegradable and endure for decades.
3. **Waste mismanagement**: Cheap production, ubiquity, and limited recycling capacity turn plastics into the prime source of litter.

## Plastics and Human Health: Emerging Evidence

1. **Chemicals of concern**: Plastics use **ethylene, propylene, styrene derivatives**, along with **bisphenols, phthalates, PCBs, PBDEs, and PFAS**.
2. **Products of exposure**: Found in food containers, bottles, teething toys, polyester, IV bags, cosmetics, paints, electronics, adhesives.
3. Health links: Studies link plastic chemicals to **thyroid dysfunction, hypertension, kidney/testicular cancer, gestational diabetes**.
4. **Evidence base**: Around 1,100 studies, involving 1.1 million individuals, compiled by Boston College & Minderoo Foundation dashboard.
5. **Nature of studies**: Mostly associative; longitudinal studies (gold standard) are still underway.

## The Microplastic Menace

1. **Definition**: Plastics smaller than 5 mm, found in additives or broken-down products.
2. **Recent discoveries**: Detected in human blood, breast milk, placenta, bone marrow.
3. **Health uncertainty**: Exact impacts still under study, but linked to multiple disorders.

## Policy Responses: Global and Indian Perspectives

- **Global scene**: Negotiations divided on waste vs production; developing countries demand funding support.
- **India's stance:**
- Ban on single-use plastics in ~20 States
- Administrative push for Extended Producer Responsibility (EPR)
- Views plastics as a waste management issue, not a health issue.
- Prefers health dimension to be dealt with at WHO, not in the plastics treaty.

## Conclusion

The Geneva deadlock reflects not just a failure of diplomacy

but the widening gap between scientific evidence and policy action. Plastics are no longer an invisible convenience; they are a **pervasive health hazard**. While India treats plastics as a waste issue, ignoring health risks leaves a blind spot in policy. A robust, binding treaty addressing both production and health impact is indispensable if the world is to prevent plastics from becoming the new tobacco of the 21st century.

## PYQ Relavance

> **[UPSC 2023]** What is oil pollution? What are its impacts on the marine ecosystem? In what way is oil pollution particularly harmful for a country like India?
>
> **Linkage:** Since UPSC has already asked about oil pollution (2023), it shows the exam's focus on pollution and ecosystem impacts. Plastic pollution, like oil, originates from fossil fuels and has severe effects on marine life and human health. Hence, a direct question on plastic pollution and its health–environment nexus is highly probable.

## Practice Mains Question
Plastics are no longer merely a waste management problem

but a serious health hazard. Critically examine the health risks associated with plastic use and evaluate India's stance in global plastic treaty negotiations.

## Mapping Microthemes
- GS-1: Impact of industrialisation and consumerism on environment.
- GS-2: International negotiations, India's foreign policy stance in environmental treaties.
- GS-3: Pollution, waste management, health-environment nexus.
- GS-4: Ethics of sustainability, intergenerational justice, corporate responsibility.

# Saltwater Crocodile Population Survey in Sundarbans

Prelims OnlySpecies | Enviro & Biodiversity | Mains Paper 3: Conservation, Environmental Pollution & Degradation, Eia

## Why in the News?
A 2025 survey by the West Bengal Forest Department shows an increase in saltwater crocodile population in the Sundarbans Biosphere Reserve (SBR).



## About Saltwater Crocodile (Crocodylus porosus):
- **Largest living reptile** and the largest of all crocodilians.

- **Males grow much larger** than females; females usually **2.5–3 m in length**.
- **Habitat**: mangrove forests, swamps, rivers, and coastal waters; tolerant of varying salinity.
- **Distribution in India**: **Odisha, West Bengal (Sundarbans), Andaman & Nicobar Islands**.
- **Behaviour**: Apex predator, feeds on carcasses and diverse prey; communicates through **barks, hisses, growls, chirps**.
- **Conservation Status:**
- **IUCN Red List**: Least Concern.
- **CITES**: Appendix I (except populations of Australia, Indonesia, PNG → Appendix II).
- **Wildlife Protection Act (1972)**: Schedule I.
- **Conservation Efforts**: Bhagabatpur Crocodile Project (1976, West Bengal) – breeding and conservation programme; 577 crocodiles released till 2022.

## Other Crocodile Species in India:
- **Gharial**: Critically Endangered; survives in only 2% of former range; Found in small stretches of **Chambal** and a few other rivers.
- **Mugger/Marsh Crocodile**: Vulnerable; found in freshwater lakes, rivers, marshes.

# [20th August 2025] The Hindu Op-ed: Making India's climate taxonomy framework work

op-ed snap | Enviro & Biodiversity | Mains Paper 3: Conservation, Environmental Pollution & Degradation, Eia

> PYQ Relevance
> **[UPSC 2022]** Discuss global warming and mention its effects on the global climate. Explain the control measures to bring down the level of greenhouse gases which cause global warming, in the light of the Kyoto Protocol, 1997.
>
> **Linkage:** If such a theme on international climate governance and mechanisms can be asked, then India's Climate Finance Taxonomy also becomes a significant area. It connects global agreements like the Paris Agreement (Article 6.4) with India's domestic instruments such as the Carbon Credit Trading Scheme and green bonds.

## Mentors Comment
In May 2025, the Ministry of Finance released the draft Climate Finance Taxonomy, India's first attempt to formally define what counts as climate-aligned investment. The framework seeks to mobilise green finance, prevent greenwashing, and give clarity to investors. Its success, however, depends on strong review systems, accountability, and stakeholder engagement.

## Introduction
The draft taxonomy marks a turning point in India's climate governance. This is India's first unified framework for climate finance, introduced amid rising greenwashing risks and investor uncertainty. Arriving alongside the operationalisation of the **Carbon Credit Trading Scheme** and the **rise of green bonds**, it comes at a moment of growing pressure to align finance with net-zero goals. As a **"living framework,"** it promises adaptability to evolving national and global priorities. But without transparency, legal coherence, and institutional accountability, the taxonomy risks undermining India's climate finance ecosystem instead of strengthening it.

## The Review Architecture for a Living Framework
1. **Two-tier review system:** Suggestion of annual reviews for **short-term corrections** and five-year reviews for deep reassessment.
2. **Annual reviews**: Triggered by implementation gaps, international obligations, or stakeholder feedback, with structured timelines, documentation protocols, and public consultation.
3. **Five-year reviews**: **Linked with India's NDC cycle** and global stocktake under the UNFCCC; ensures long-term resilience in a changing climate finance ecosystem.

## Key aspects of the Substantive Review
1. **Legal coherence**: Taxonomy must align with **Energy Conservation Act, SEBI norms, Carbon Credit Trading Scheme**, and India's international commitments.
2. **Harmonisation**: Review should remove overlaps, clarify redundancies, and integrate with green bonds, blended finance, and environmental risk disclosures.
3. **Content clarity**: Definitions must remain **readable, coherent, and technically precise**. Quantitative thresholds (e.g., emissions reduction, energy efficiency benchmarks) must be regularly updated with empirical data.
4. **Inclusivity**: Framework must remain accessible to **MSMEs, informal sector, agriculture, and small manufacturing** with staggered compliance timelines and proportionate expectations.

## Strengthening Governance through Accountability Structures
1. **Standing unit in the Ministry of Finance**: Dedicated body within the **Department of Economic Affairs** or an expert committee involving financial regulators, climate science institutions, civil society.
2. **Public dashboards**: Mechanisms to receive inputs, document experiences, and publish reports.
3. **Transparency**: Annual review summaries and five-year revision proposals should be made public in consolidated formats to enhance investor trust and policy coherence.

## Significance of the Climate Finance Taxonomy for India's Green Transition
1. **Carbon Credit Trading Scheme**: Soon to be fully operational, requiring clear rules for market credibility.
2. **Green bonds**: Entering mainstream portfolios and stock exchanges, need alignment with taxonomy standards.
3. **Public investment flows**: Rising pressure to align fiscal spending with long-term climate goals.
4. **Risk of failure**: A weak or opaque taxonomy could undermine India's net-zero transition by encouraging greenwashing and eroding investor trust.

## Conclusion
India's climate taxonomy is more than a definitional exercise, it is a governance tool that can determine the credibility of India's climate finance system. A "living document" is meaningful only if it is kept alive through active review, structured revision, and transparent engagement. By embedding legal coherence, inclusivity, and accountability, India can ensure the taxonomy becomes a reliable foundation for mobilising investments, reducing greenwashing, and achieving its climate goals.

## Value Addition
- **Article 6.4 of the Paris Agreement:** Provides a framework for carbon market instruments with legal and editorial review mechanisms; offers a model for India's taxonomy to ensure transparency, credibility, and alignment with global norms.
- **Carbon Market Types:**
- **Compliance Markets**: Mandated by law (e.g., EU ETS, upcoming India's Carbon Credit Trading Scheme).

- **Voluntary Markets**: Corporate/individual offsetting of emissions beyond legal requirements.
- **Green Bonds in India:**
- **First Sovereign Green Bonds** issued in 2023 worth ₹16,000 crore.
- Used for renewable energy, clean transport, and climate adaptation projects.
- Support India's target of net-zero by 2070 and deepen climate finance flows.

### Mapping Microthemes
- **GS Paper II:** Governance, public consultation, accountability mechanisms.
- **GS Paper III:** Climate finance, carbon markets, sustainable development, green bonds, **energy** efficiency.
- **GS Paper IV:** Ethical finance, transparency, preventing greenwashing.

# NTCA limits definition of Tiger Corridors

<u>Prelims Only</u> | <u>Enviro & Biodiversity</u> | <u>Mains Paper 3</u>: Conservation, Environmental Pollution & Degradation, Eia

### Why in the News?
The National Tiger Conservation Authority (NTCA) recently issued a clarification limiting tiger corridors primarily to 32 "least cost pathways" identified in 2014.

### About National Tiger Conservation Authority (NTCA):
- **Statutory body**: Under Ministry of Environment, Forest and Climate Change (MoEFCC).
- **Establishment**: Created in **2006** under the **Wildlife Protection Act, 1972.**
- **Functions**: Provides **legal backing to Project Tiger**, ensures Centre–State accountability via MoUs, and enables Parliamentary oversight.
- **Community Role**: Addresses livelihood concerns of people around tiger reserves.
- **Composition**: Chaired by MoEFCC Minister, Vice-Chairperson MoS, 3 Members of Parliament, MoEFCC Secretary, and others.

### What are Tiger Corridors?
- **Definition**: Landscape linkages between tiger habitats that allow safe passage, genetic flow, and survival.
- **Need**: Prevent isolation of tiger populations and human–tiger conflicts.

- **Examples of Macro-Corridors**:
- **Shivalik–Gangetic Plains**: Corbett–Dudhwa, Dudhwa–Kishanpur–Katerniaghat.
- **Central India & Eastern Ghats**: Ranthambhore–Kuno–Madhav, Kanha–Pench, Bandhavgarh–Achanakmar.
- **Western Ghats**: Sahyadri–Konkan–Radhanagari–Goa–Karnataka.
- **Northeast & Brahmaputra**: Kaziranga–Karbi Anglong, Manas–Buxa.
- **Sundarbans Landscape**.

### NTCA's Policy Reversal:
- **July 25 Affidavit**: Said corridor identification must use multiple data sources – protected areas, 2014 NTCA pathways, Tiger Conservation Plans (TCPs), Wildlife Institute of India (WII) studies (2016, 2021), and All-India Tiger Estimation (AITE) data.
- **August 21 Clarification**: Limited definition only to 2014 least-cost pathways (32 corridors) and TCP corridors.
- **Exclusions**: WII studies and AITE data dropped, despite 2014 report itself warning that listed corridors were "minimal requirement."

> **[UPSC 2020]** Among the following Tiger Reserves, which one has the largest area under "Critical Tiger Habitat"? Options: (a) Corbett (b) Ranthambore (c) Nagarjunsagar-Srisailam* (d) Sunderbans

# Haryana defines 'Forest': Controversy and Implications

<u>Prelims Only</u> | <u>Enviro & Biodiversity</u> | <u>Mains Paper 3</u>: Conservation, Environmental Pollution & Degradation, Eia

### Why in the News?
Haryana has notified the dictionary meaning of "forest" as per Supreme Court directions.

**CANOPY CRITERION TOO HIGH FOR HRY: EXPERTS**

**Definition of forest as per SC**

Top court, in its 1996 TN Godavarman vs Union of India case, emphasised on application of 'dictionary meaning of forests' — which means all areas that meet the characteristics of forests must be protected under the Forest (Conservation) Act, regardless of the land's ownership or its status in govt records

**Haryana's criteria for 'forest by dictionary definition'**

Puts the following two conditions for recognising forests:

1. **5-hectare forest area** in isolation **OR** **2-hectare forest area** contiguous with a notified forest in govt records

2. These forests must have canopy density of at least 0.4, which means at least 40% of the ground should be covered by tree crowns

**What this excludes** | Scrublands, grasslands, strip forests, low vegetation forests, plantations, orchards, patches of agro-forestry vegetation, small groves, common lands

Experts say the state's definition would exclude most of the Aravalis that don't have any legal cover as the hill range is naturally a 'semi-arid' forest

## Haryana's definition of Forest:
- **Definition:** A patch of land is deemed a forest if:
- **Minimum area**: 5 hectares (isolated) or 2 hectares (contiguous with notified forest).
- **Minimum canopy density:** 0.4 (40%) or more.
- **Exclusions**: Linear/compact/agro-forestry plantations and orchards outside government-notified forests.
- **Aim**: Create a uniform standard for identifying forests under the **Forest (Conservation) Act, 1980 (FCA).**

## Issues with Haryana's Definition:
- **High thresholds**:

- 40% canopy cover excludes scrub forests and dry deciduous vegetation like the Aravallis.
- 2–5 hectare size requirement too high for an arid state with fragmented green cover.
- **Exclusion of Aravallis**: Sensitive ridge areas risk exposure to **illegal mining, encroachment, and real estate development**.
- **Contradiction with Godavarman judgment (1996)**: SC had ruled that "forest" must be understood in its **dictionary meaning**, regardless of size, ownership, or canopy density.
- **Dilution of protection under FCA 1980**: Narrows the scope of land eligible for forest safeguards.

## Godavarman Case & FCA Background:
- **Forest (Conservation) Act, 1980**: Restricted dereservation/diversion of forest land without Centre's approval.
- **T N Godavarman v Union of India (1996)**: Court ruled "forest" must be understood in its **dictionary meaning**, covering all forested lands regardless of ownership or official status.
- **2023 FCA Amendment**: Limited scope to notified forests and recorded forest lands.
- Amendment challenged by retired IFS officers and NGOs for **diluting FCA protections**.
- **SC in February 2024 directed States/UTs** to continue using **Godavarman definition** while case is ongoing.

**[UPSC 2005]** The minimum land area recommended for forest cover to maintain proper ecological balance in India is
Options: (a) 0.25 (b) 0.33* (c) 0.43 (d) 0.53

# GEOGRAPHY

# African Union (AU) and the Mercator Map Debate

Prelims Onlyworld map | Geography | Mains Paper 1: Salient Features Of World'S Physical Geography

## Why in the News?
The African Union (AU) has endorsed the Correct the Map campaign to replace the 16th-century Mercator projection with more accurate maps.



Mercator projection / Equal Earth projection
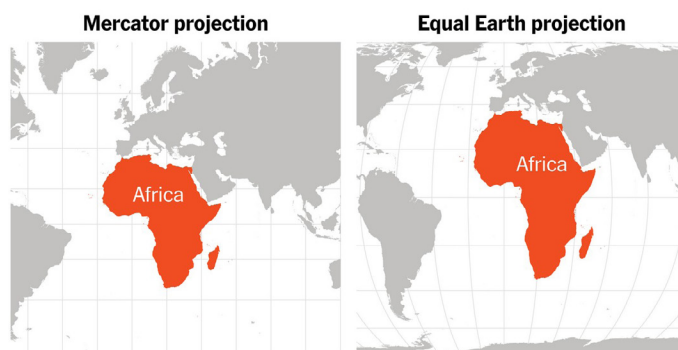
## About the African Union (AU):

- **Establishment**: Formed in 2002, replacing the Organisation of African Unity (1963).
- **Membership**: 55 African countries.
- **Headquarters**: Addis Ababa, Ethiopia.
- **Vision**: "An Integrated, Prosperous, and Peaceful Africa, driven by its own citizens."
- **Agenda 2063**: Blueprint for socio-economic growth and continental unity.
- **Main Organs**: Assembly, Executive Council, AU Commission, Peace and Security Council.

## What is a Mercator Map?

- **Creation**: Designed in **1569** by **Gerardus Mercator**.
- **Projection**: Cylindrical map with straight longitude and latitude lines intersecting at 90°.
- **Purpose**: Enabled sailors to plot straight-line courses for compass navigation.
- **Adoption**: Became the standard map in schools, atlases, and wall charts by the 19th century.

## Issues with the Mercator Map:

- **Distortion**: Enlarges high-latitude regions (Europe, Russia, North America) while shrinking Africa and South America.
- **Example**: Greenland appears equal to Africa, though Africa is ~14 times larger.
- **Colonial Bias**: Reinforced Western dominance narratives and downplayed Africa's size and importance.
- **Impact**: Supported marginalisation and exploitation during colonialism.
- **Alternatives**: Gall-Peters (1970s) and Equal Earth (2018) projections show continents in correct proportion.
- **AU Stand**: Advocates replacing Mercator maps to restore Africa's rightful global image.

> **[UPSC 2024]** The longest border between any two countries in the world is between:
> Options: (a) Canada and the USA * (b) Chile and Argentina (c) China and India (d) Kazakhstan and Russian Federation

# SCIENCE TECH

# MIT Research of Ionic Liquids (ILs)

: Awareness in various sc and tech fields

## Why in the News?

MIT-led research suggests life may not need liquid water; ionic liquids (salts that stay liquid below 100°C) could support life on rocky super-Earths with volcanic activity and little water.

## About Ionic Liquids (ILs):

- **Overview**: Salts in **liquid form below 100°C**, composed entirely of ions.
- **Properties**: Non-volatile, non-flammable, thermally stable, and tunable as hydrophobic or hydrophilic.
- **Structure**: Unlike water (neutral molecules), ILs consist of **ions and ion pairs**.
- **Electrochemical Use**: Excellent **electrolytes** with broad electrochemical windows.
- **Applications**: Used in synthesis, catalysis, electrochemistry, extraction, biotechnology, and as green alternatives to volatile solvents.

## Breakthrough Findings of MIT Study:

- **Life Without Water**: Experiments showed life could potentially survive using ILs as solvents instead of water.
- **Natural Formation**: Sulfuric acid mixed with nitrogen compounds can naturally form ILs.
- **Exoplanet Link**: Such ILs may exist on rocky super-Earths with volcanic activity and thin atmospheres.
- **Venus Research Origin**: Discovery emerged from studying Venus, where sulfuric acid clouds interact with organic molecules to form ILs.
- **Biological Relevance**: ILs can provide stable environments for biomolecules, supporting metabolism.

## Significance of the Study:

- **Habitability Expansion**: Broadens habitability definition beyond water-based models.
- **Biosignatures**: Suggests new chemical markers for exoplanet life detection.
- **Venus Missions**: Strengthens rationale for Venus's exploration targeting IL-based chemistry.
- **Wider Habitable Zones**: Implies more planets could host life than previously thought.

# Chalkiness in Rice and the Genetic Breakthrough

Prelims Only | Science Tech | Mains Paper 3: Awareness in various sc and tech fields

## Why in the News?

Recently, Chinese scientists identified a key gene, Chalk9, that controls chalkiness in rice, offering a breakthrough for crop improvement.

## About Chalk9 Gene in Rice:

- **Overview**: Chalk9 is a gene found on chromosome 9 of rice.
- **Function**: Encodes the enzyme **E3 ubiquitin ligase**, which regulates protein degradation.
- **Target Protein**: Acts on **OsEBP89**, a regulator of starch-synthesis genes **Wx** and **SSP**.
- **Chalk9-L Variant**: Promotes OsEBP89 degradation → prevents excess starch accumulation → results in low chalkiness and translucent grains.
- **Chalk9-H Variant**: Fails to degrade OsEBP89 efficiently → leads to starch buildup → high chalkiness and brittle grains.

## Significance:

- **Grain Quality**: Chalkiness lowers milling recovery and reduces rice's commercial value.
- **Genetic Solution**: Discovery of Chalk9 offers a direct genetic tool to reduce chalkiness.
- **Breeding Advantage**: Rice breeding programs can introduce Chalk9-L to produce premium low-chalk rice.
- **Economic Impact**: Improves farmer income and enhances food security.
- **Consumer Preference**: Meets demand for better quality, translucent rice varieties.

# Scientists turn E. Coli Bacteria into a Bio-Sensor

Prelims Only | Science Tech | Mains Paper 3: Awareness in various sc and tech fields

## Why in the News?

Researchers from UK and China have developed a bioelectronic device where genetically engineered E. Coli bacteria act as self-powered chemical bio-sensor.

## About Escherichia coli (E. coli) Bacteria:

- **Overview**: **Gram-negative**, **rod-shaped** bacterium that inhabits the **lower intestine** of warm-blooded animals.
- **Family**: Belongs to the **Enterobacteriaceae family**.
- **Harmless vs Pathogenic**: Most strains are **harmless**, but some (e.g., E. coli O157:H7) cause severe foodborne **illness, diarrhoea, and kidney complications**.
- **Gut Role**: Contributes to **vitamin $K_2$ synthesis** and maintains **gut microbiota balance**.
- **Transmission**: Pathogenic strains **spread via contaminated food, water, or direct contact**, leading to outbreaks.
- **Diagnostic Importance**: Presence in water is a key indicator of **faecal contamination**.

## Bio-Sensors Generated Using E. coli

- **Innovation**: Genetically engineered E. coli used as **self-powered chemical biosensors**.
- **Mechanism**: Detect compounds, process signals, and produce electrical outputs compatible with low-cost electronics.
- **Modules**:
- **Sensing Module**: Detects target molecules.

- **Processing Module**: Amplifies or modifies signals.
- **Output Module**: Produces phenazines measurable via electrochemistry.
- **Applications**:
- Detected **arabinose** (plant sugar) **within 2 hours**.
- Detected **mercury ions** in water at trace levels (below WHO safety limits) within 3 hours.
- Demonstrated an **"AND" logic gate**, producing signals only when two molecules were present together.
- **Significance**:
- Cheaper, programmable, and robust alternative to enzyme-based biosensors.
- Potential in **environmental monitoring, water safety, medical diagnostics, and bioelectronics**.

# Primary Amoebic Meningoencephalitis (PAM)

Prelims Only | Science Tech | Mains Paper 3: Awareness in various sc and tech fields

## Why in the News?
Kerala's health department has issued an alert in Kozhikode district after three consecutive cases of the rare and highly fatal disease Primary Amoebic Meningoencephalitis (PAM) were reported.

## About Primary Amoebic Meningoencephalitis (PAM):
- **Cause**: Rare and usually fatal infection caused by **Naegleria fowleri**, known as the "brain-eating amoeba."
- **Habitat**: Thrives in warm freshwater up to 46°C (115°F).
- **Entry**: Enters **through the nose** during swimming or water activities, travels via olfactory nerve to the brain.
- **Impact**: **Destroys brain tissue** and causes severe swelling.
- **Transmission**: Not communicable from person to person.
- **Symptoms**: Headache, fever, nausea, vomiting, stiff neck, confusion, seizures, hallucinations, coma, and death.
- **Progression**: According to the Centers for Disease Control and Prevention (CDC), most cases result in death within 1–18 days of symptom onset.

## Diagnosis and Treatment:
- **Diagnosis**:
- Very difficult due to rarity.
- Confirmed by **Polymerase Chain Reaction (PCR) test** of cerebrospinal fluid (CSF).
- Frequently misdiagnosed as bacterial or viral meningitis.
- **Treatment**:
- **No single therapy** effectively established.
- **Managed per CDC guidelines** using drug combinations such as: Medical interventions typically involve a combination of drugs, including amphotericin B, azithromycin, fluconazole, rifampin, miltefosine, and dexamethasone.

# How are Soaps and Detergents manufactured?

Prelims Only | Science Tech | Mains Paper 3: S&T - Applications In Everyday Life

## Why in the News?
This newscard is an excerpt from the original article published in 'The Hindu'.

## About Soap:
- **Composition**: Soap is sodium (Na) or potassium (K) salt of fatty acids derived from vegetable oils or animal fats.
- **Formula**: Solid soaps are RCOONa, liquid soaps are RCOOK.
- **Function**: Cleansing agent due to dual hydrophilic (water-attracting) and hydrophobic (oil-attracting) nature.
- **History**: Used since 2800 BC in Mesopotamia and ancient India (soap nuts, bark, flowers). Became mass-produced during the Industrial Revolution, initially a luxury.

## Soap-Making Process
- **Raw Materials**: Oils such as coconut, olive, palm, sunflower

provide triglycerides.
- **Hydrolysis**: Oils hydrolysed with hot water under pressure → fatty acids + glycerin.
- **Saponification**: Fatty acids react with sodium hydroxide (NaOH) → soap (RCOONa) + water.
- **Processing**: Soap dried into noodles, blended with perfumes, colours, fillers, additives.
- **Shaping**: Extruded, cut, and stamped into bars.
- **Quality**: Total Fatty Matter (TFM) indicates quality; higher TFM = better cleansing.
- **Production Scale**: Modern automated lines make 600–700 soaps per minute.

## Ecological Impact of Soap
- **Biodegradability**: Traditional soaps are biodegradable and safer for the environment.
- **Detergents**: Synthetic alternatives developed during World War I oil shortages; more efficient but harmful.
- **Pollution**: Surfactants and phosphates in detergents cause nutrient pollution and persist in ecosystems.

[UPSC 2002] Consider the following statements:
Assertion (A) Synthetic detergents can lather well in hard water.
Reason (R): Synthetic detergents form soluble calcium and magnesium salts with hard water.
Which one of the following is correct in respect of the above statements?
Options:
(a) Both A and R are individually true and R is the correct explanation of A *
(b) Both A and R are individually true but R is not a correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

# Bistability in Pseudomonas aeruginosa and the glpD Gene

Prelims Only | Science Tech | Mains Paper 3: Awareness in various sc and tech fields

## Why in the News?
German researchers found that P. aeruginosa bacteria can switch a key gene (glpD) on or off, even though the bacteria are genetically identical — a survival trick called epigenetic bistability.
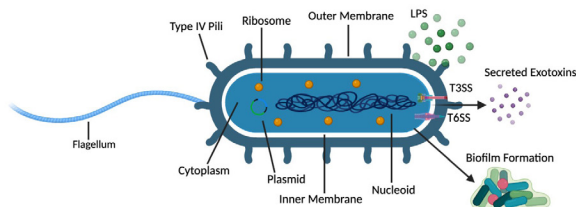


## About Pseudomonas aeruginosa:
- **Nature**: Rod-shaped **bacterium** found in soil, water, and hospital environments.
- **Pathogen Type**: Opportunistic; infects mainly those with **weakened immunity**.
- **Resistance**: Forms biofilms (protective layers), making it **highly resistant to antibiotics**.
- **Genetic Flexibility**: Large genome (~6,000 genes) allows **adaptation to diverse environments**.

## Impact on Humans:
- **Hospital Infections**: Leading cause of hospital-acquired infections.
- **Vulnerable Groups**: Burn patients, catheter users, cystic fibrosis patients.
- **Diseases Caused**: Keratitis (eye infection), urinary tract infections, pneumonia, bloodstream infections.
- **Mortality**: Strong antibiotic resistance makes treatment difficult, leading to high hospital deaths.

## Recent Research Findings:
- **Discovery**: German researchers identified bistable expression of the **glpD gene** (active in some cells, inactive in others).
- **Survival Advantage**: This variability helps bacteria survive hostile conditions and trigger infections even from small populations.
- **Experiments**:
- Cells with glpD active were more lethal in moth larvae and mouse immune models.
- Cells without glpD showed reduced infection ability.
- **Significance**: On–off switching of glpD is a survival and infection strategy; targeting this mechanism may lead to new treatments for resistant infections.

[UPSC 2010] Which bacterial strain, developed from natural isolated by genetic manipulations, can be used for treating oil spills?
Options: (a) Agrodbacterium (b) Clostridium (c) Nitrosomonas (d) Pseudomonas*

# Agni-5 Intermediate-Range Ballistic Missile

## Why in the News?
India has successfully test-fired the Agni-5 Intermediate-Range Ballistic Missile (IRBM) from the Integrated Test Range, Chandipur (Odisha).

## What are Ballistic Missiles?
- **Powered by**: Solid propellant rocket motors; thrust generated by exhaust gases forces missile upward.
- **Three phases**:
- **Boost Phase** – missile consumes propellant; trajectory fixed.
- **Midcourse Phase** – missile coasts in space on momentum.
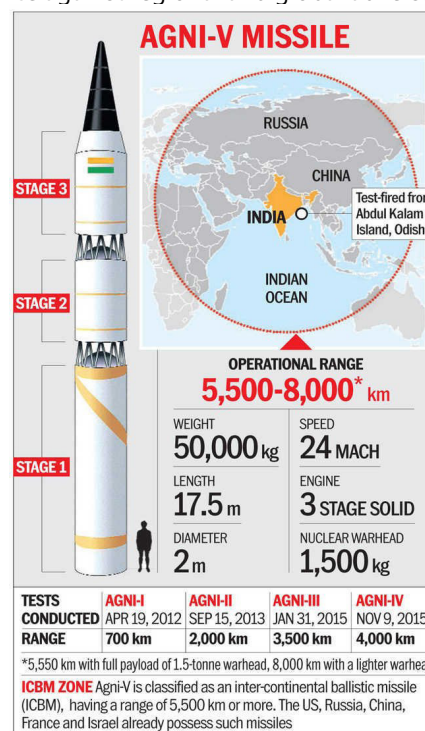- **Terminal Phase** – warheads re-enter atmosphere and strike target.

## About Agni-5:
- **Type**: Intercontinental Ballistic Missile (ICBM) developed by **DRDO**.
- **Range**: 5,000–5,500 km (upgrade under development up to 7,500 km).
- **Propulsion**: Three-stage, **solid-fuel** rocket motors.
- **Payload**: ~1.5 tonnes, nuclear-capable.
- **Multiple Independently Targetable Re-entry Vehicle (MIRV) Technology:** Can carry multiple nuclear warheads that target different locations.
- **Features**: Fire-and-forget system, advanced navigation, guidance and propulsion technologies.
- **First Test**: 2012 from Wheeler Island (Odisha).
- **Strategic Role**: Strengthens India's **nuclear deterrence posture**, especially vis-à-vis China.

## Back2Basics: Agni Series and its Development
- **Origins**: Began in **1983** under the **Integrated Guided Missile Development Programme (IGMDP)** led by A.P.J. Abdul Kalam.
- **Evolution**: Started as technology demonstrators for re-entry vehicles; later developed into full-fledged strategic missiles.
- **Variants**:
- **Agni-I**: 700–1,200 km range, inducted 2007.
- **Agni-II**: 2,000–3,000 km range, inducted 2010.
- **Agni-III**: 3,500 km range, highly accurate, tested 2007.
- **Agni-IV**: 4,000 km range, advanced avionics, tested 2011.
- **Agni-V**: 5,000+ km range, ICBM, MIRV capable.
- **Agni Prime (Agni-P)**: 1,000–2,000 km, lighter, tested 2021.
- **Agni-VI**: Under development, 6,000–10,000 km, MIRV + submarine launch capable.
- **Significance**: Backbone of **India's nuclear triad**, enhancing deterrence against regional and global adversaries.



**AGNI-V MISSILE**

STAGE 3 / STAGE 2 / STAGE 1

RUSSIA / CHINA / INDIA / INDIAN OCEAN

Test-fired from Abdul Kalam Island, Odisha

**OPERATIONAL RANGE**
**5,500-8,000* km**

| WEIGHT | SPEED |
| --- | --- |
| 50,000 kg | 24 MACH |
| LENGTH | ENGINE |
| 17.5 m | 3 STAGE SOLID |
| DIAMETER | NUCLEAR WARHEAD |
| 2 m | 1,500 kg |

| TESTS CONDUCTED | AGNI-I | AGNI-II | AGNI-III | AGNI-IV |
| --- | --- | --- | --- | --- |
| | APR 19, 2012 | SEP 15, 2013 | JAN 31, 2015 | NOV 9, 2015 |
| RANGE | 700 km | 2,000 km | 3,500 km | 4,000 km |

*5,550 km with full payload of 1.5-tonne warhead, 8,000 km with a lighter warhead

**ICBM ZONE** Agni-V is classified as an inter-continental ballistic missile (ICBM), having a range of 5,500 km or more. The US, Russia, China, France and Israel already possess such missiles.

[UPSC 2023] Consider the following statements:
1. Ballistic missiles are jet-propelled at subsonic speeds throughout their fights, while cruise missiles are rocket-powered only in the initial phase of flight.
2. Agni-V is a medium-range supersonic cruise missile, while BrahMos is a solid-fuelled intercontinental ballistic missile.
Which of the statements given above is/are correct?
Options: (a) 1 only (b) 2 only (c) Both 1 and 2 (d) Neither 1 nor 2*

# Why India needs a national space law

India is entering a new era of space exploration with lunar success, Gaganyaan, and the proposed **Bharat Antariksh Station**. Yet, one critical element is missing, a **national space law.** While India has ratified global treaties like the **Outer Space Treaty (1967),** it lacks a domestic legal framework to

regulate private participation, ensure liability, and attract investment. As space activities expand beyond government agencies to startups and private players, the absence of clear laws poses risks to accountability, innovation, and global competitiveness.

## The Urgency of a National Space Law

1. **Major milestone vs. missing law**: India's scientific achievements are unmatched, but the **legal architecture remains absent**, risking accountability gaps.
2. **Private participation**: With startups entering, lack of clarity on **licensing, FDI rules, liability, and insurance** creates operational hurdles.
3. **International responsibility**: Under the **Outer Space Treaty**, India is responsible for both governmental and private activities, yet it lacks the domestic framework to enforce compliance.
4. **Global contrast**: Countries like the **U.S., Japan, and Luxembourg** already have national legislation that provides legal certainty and attracts investment.

## Principles of the Outer Space Treaty

1. **Foundational principles**: **Space is the province of all mankind**, prohibiting national appropriation and militarisation.
2. **State responsibility**: Nations are responsible for activities in space, whether by state or private entities.
3. **Liability framework**: Countries bear liability for damages caused by their space objects.
4. **Not self-executing**: According to **UNOOSA**, national laws are essential to translate treaty principles into enforceable domestic regulations.

## India's Incremental Approach to Space Legislation

1. **Methodical strategy**: India is incremental and cautious, ensuring technical regulations precede overarching law.
2. **Catalogue of Indian Standards**: A framework to ensure safety of space operations.
3. **Indian Space Policy (ISP), 2023:** Encourages **non-governmental participation** in space activities.
4. **IN-SPACe Norms, Guidelines and Procedures (NPG):** Provide procedures for authorisation of space activities.
5. **Pending gap**: The broader Space Activities Law that incorporates treaty obligations is still not enacted.

## Industry Concerns and Operational Challenges

1. **Statutory authority gap**: **IN-SPACe lacks formal legal backing**, leaving decisions open to procedural challenges.
2. **Licensing and delays**: Companies face multiple ministry clearances, creating uncertainty.
3. **FDI rules**: Industry demands clarity, such as 100% automatic FDI in satellite components to attract capital.
4. **Liability and insurance**: While India is internationally liable, companies need affordable third-party insurance to cover risks.
5. **Intellectual property protection**: Current frameworks risk talent and tech migration to IP-friendly nations.
6. **Space debris management**: Absence of mandatory accident investigations and debris laws increases operational risks.

## The Importance of Affordable Insurance for Space Startups

1. **High-value assets**: Satellites and payloads involve massive investments; startups cannot absorb losses alone.
2. **Global liability**: India bears responsibility internationally, so private players must secure third-party insurance.
3. **Investor confidence**: Insurance frameworks encourage investors, reducing risk aversion.
4. **Innovation support**: Affordable insurance ensures startups can experiment and grow, without fear of crippling liability.

## Conclusion

India's space programme has made historic strides, but without a comprehensive national space law, its progress risks being undermined by regulatory gaps. A forward-looking framework ensuring **clarity, liability management, insurance, IP protection, and statutory backing for IN-SPACe** is essential to balance innovation with responsibility. The future of India's space leadership will depend as much on **strong laws as on strong rockets**.

## Value Addition

- **UNOOSA Insight**: National laws act as the domestic enabler of international obligations. Without them, treaty principles remain unenforceable.
- Comparative Perspective:
- United States: Commercial Space Launch Act allows private launches with liability coverage.
- Luxembourg: Pioneered space mining rights to attract global investors.
- Japan: Provides licensing, insurance, and debris mitigation guidelines.
- **Governance Lens**: Reflects the larger theme of state capacity to regulate frontier technologies, similar to how data protection laws govern digital economies.
- **Economic Angle**: A robust legal framework will strengthen India's space economy, valued at nearly **$9.6 billion (2020)** and projected to grow to **$13 billion by 2025**.
- **Investor Confidence**: Insurance frameworks, clear FDI rules, and IP protection create a trustworthy ecosystem for global investors.
- **Security Dimension**: Dual-use nature of space technologies necessitates clarity in export controls and defence linkages.
- **Ethical Dimension**: Covers responsibility towards space debris management and sustainability of outer space as a global commons.

## Mapping Microthemes

- **GS Paper II (Governance, International Relations):**
- Outer Space Treaty (1967) – India's obligations and global responsibility
- Role of UNOOSA – multilateral governance of outer space
- Need for National Legislation – predictability, legal clarity, statutory backing for IN-SPACe
- **GS Paper III (Science & Technology, Economy, Security):**
- Growth of India's Space Economy – Chandrayaan-3, Gaganyaan, startups, private players
- Insurance and Liability – affordability for startups, international responsibility for damages
- Intellectual Property Rights – preventing brain drain, encouraging innovation

- Space Debris Management – sustainability and accident investigation procedures
- Dual-Use Technology Challenge – balancing civilian and defence aspects
- **GS Paper IV (Ethics & Governance):**
- Accountability in Outer Space – who bears liability for damage?
- Ethics of Space Exploration – sustainability, "province of mankind" principle
- Equitable Access – preventing monopolisation of space resources by few nations

# [pib] Prototype Fast Breeder Reactor (PFBR)

Prelims Only | Science Tech | Mains Paper 3: Awareness in various sc and tech fields

## Why in the News?
The Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI) 500 MWe Prototype Fast Breeder Reactor (PFBR) at Kalpakkam, Tamil Nadu, is scheduled to achieve criticality in March 2026 and reach full power generation by December 2026.

## What is a Fast Breeder Reactor (FBR)?
- A Fast Breeder Reactor (FBR) is a type of nuclear reactor that **generates more fuel than it consumes**, essentially "breeding" more nuclear material to power itself and future reactors.
- It does this by using high-energy, or **"fast," neutrons** to convert abundant, non-fissile uranium (U-238) into fissile plutonium (Pu-239) for fuel.

## About India's Prototype Fast Breeder Reactor (PFBR):
- **Design began**: 1980s as prototype for future 600 MWe FBRs.
- **Timeline**: Construction began in 2004, faced delays; cost escalated from ₹3,500 crore to ₹7,700 crore.
- **Capacity**: 500 MWe, sodium-cooled fast breeder reactor.
- **Predecessors**: It builds on India's earlier reactors: **KAMINI** and **Fast Breeder Test Reactor (FBTR)**.
- **Technology**: Completely indigenous, designed by **Indira Gandhi Centre for Atomic Research (IGCAR)**.
- **Fuel**: Uranium-Plutonium mixed oxide (MOX); later stages to use **Thorium-232** to breed fissile **U-233**.
- **Burnup**: 100 GWd/t, reactor life ~40 years.
- **Coolant**: 1,750 tonnes of liquid sodium; pool-type design with high thermal inertia.
- **Construction agencies**: Uranium-Plutonium mixed oxide (MOX) fuel fabricated by BARC Tarapur; reactor equipment by BHEL.
- **Site**: Kokkilamedu, near Kalpakkam (next to Madras Atomic Power Station).

## Significance in India's Nuclear Programme:
- PFBR is the **second stage** of India's three-stage programme:
- **Stage 1**: Pressurised Heavy Water Reactors (PHWRs) using natural uranium.
- **Stage 2**: Fast Breeder Reactors producing plutonium and U-233 from thorium.
- **Stage 3**: Thorium-based U-233 fuel cycle.
- **Enables closed fuel cycle**: recovery and recycling of fissile and fertile material from spent nuclear fuel (SNF).
- **Enhances energy security** by optimally utilising limited uranium and vast thorium reserves.
- **Reduces radioactive waste** through recycling.

# ART AND CULTURE

## In news: Gugga Naumi Festival

### Why in the News?
The Gugga Naumi festival was widely celebrated across northern states of India on 17th August.

### About Gugga Naumi Festival:
- **Festival**: Folk religious celebration in **Rajasthan, Haryana, Punjab, Jammu & Kashmir, Uttar Pradesh, and northern states**.
- **Timing**: Observed on the ninth day of Krishna Paksha in Bhadrapad month, usually after Janmashtami.
- **Deity**: Dedicated to Gugga (Gugga Pir / Gugga Zahir Pir / Guaaji), a Chauhan Rajput prince believed to control snakes.
- **Tradition**: Reflects syncretic worship by **Hindus** and **Muslims**, showcasing folk religiosity beyond formal religion.

### Key Features:
- **Duration**: Begins on Rakhi and lasts nine days, with pilgrimages to Gugga Medi village in Hanumangarh, Rajasthan.
- **Rituals**: Garudas (snake charmers and healers) carry Gugga Pir's Chahad (standard).
- **Devotion**: Pir ke Sole (songs) sung, fairs organised at shrines (Marhis).
- **Depiction**: Gugga shown riding a blue horse, with blue and yellow flags.
- **Belief**: Worshipped by mothers for children's health, and by barren women for fertility blessings.

> **[UPSC 2018]** Consider the following pairs: Tradition State
> 1. Chapchar Kut festival — Mizoram
> 2. Khongjom Parba ballad — Manipur
> 3. Thong-To dance — Sikkim
> Which of the pairs given above is/are correct?
> (a) 1 only (b) 1 and 2* (c) 3 only (d) 2 and 3

# HISTORY

## Red Fort as the Venue for Independence Day

### Why in the News?
On August 15, 2025, Prime Minister delivered the longest **Independence Day speech (103 minutes)** from the Red Fort, continuing a tradition started by Jawaharlal Nehru in 1947. The fort's choice as the venue reflects its historic role as Delhi's seat of power and symbol of sovereignty.

### About the Red Fort:
- **Construction**: Built in **1648** by Mughal Emperor **Shah Jahan** as the palace fort of **Shahjahanabad**, his new capital.
- **Material**: Enclosed by massive red sandstone walls with royal pavilions and apartments.
- **Water Feature**: Contained the **Nahr-i-Behisht ("Stream of Paradise")**, a continuous water channel.
- **Architectural Value**: Prime example of Mughal architecture, blending Islamic traditions with Indian craftsmanship.
- **Recognition**: Declared a **UNESCO World Heritage**

Site in **2007**.

## Historical Significance of Delhi and Red Fort:
- **Delhi's Role**: Seat of power for nearly a thousand years, regarded as "capital of all Hindustan" by Babur.
- **Shahjahanabad**: Inaugurated in 1648 with the Red Fort at its centre.
- **Symbol of Sovereignty**: Even after Mughal decline, Delhi remained central; East India Company minted coins in the emperor's name.

## 1857 Revolt and British Authority:
- **Revolt Centre**: Bahadur **Shah Zafar** was declared leader by sepoys in Delhi.
- **Aftermath**: Fall of Delhi ended Mughal rule; Zafar was exiled.
- **Fort Damage**: British converted Red Fort into a military garrison, destroying ~80% of interiors.
- **Imperial Authority**: Delhi Durbars (1877, 1903, 1911) as-serted British control before capital shifted from Calcutta to Delhi in 1911.

## Significance of Red Fort for Independence Day:
- **INA Trials**: Held in Red Fort in 1946, igniting nationalist fervour.
- **1947 Ceremony**: Jawaharlal Nehru hoisted the national flag on 15 August 1947 and gave the first Independence Day address.
- **Tradition**: Since then, every Prime Minister hoists the flag and addresses the nation from its ramparts.
- **Symbolism**: Site once stamped with colonial dominance, now reclaimed as a symbol of India's sovereignty.

> **[UPSC 2021]** What was the exact constitutional status of India on 26th January, 1950?
> Options: (a) A democratic Republic (b) A Sovereign Democratic Republic* (c) A Sovereign Secular Democratic Republic (d) A Sovereign Socialist Secular Democratic Republic

# Young Bengal Movement and Henry Derozio

## Why in the News?
This newscard is an excerpt from the article originally published in The Hindu.



## Who was Henry Vivian Louis Derozio?
- **Birth–Death**: Born 1809, died- 22 in 1831; **Indo-Portuguese origin**.
- **Identity**: Radical thinker, poet, and educator in British India.
- **Recognition**: Called the **first national poet of modern India**; pioneer of Anglo-Indian poetry.
- **Influences**: Inspired by Enlightenment ideals and the **French Revolution**.
- **Career**: Became **lecturer at Hindu College**, Calcutta in 1826 at just 17.
- **Role**: Inspired students with **rationalism, liberty, and free thought**.
- **Writings**: Poems (1827), The Fakeer of Jungheera (1828), and To India – My Native Land (first modern patriotic poem in English).
- **Themes**: Expressed India's decline with **images of a caged eagle** and a broken instrument; advocated freedom and abolition of slavery.
- **Dismissal**: Removed from Hindu College in 1831 on **charges of spreading atheism**.

## The Young Bengal Movement:
- **Formation**: Radical group of his students, also called **Derozians**.
- **Association**: Founded the **Academic Association**, debating social and political reform.
- **Ideals**: Advocated rationalism, women's rights, freedom of thought; opposed caste, superstition, idolatry.
- **Political Role**: In 1843, with George Thompson, formed **India's first political party** – **Bengal British India Society.**
- **Notable Member**: Radhanath Sikdar, mathematician **who first calculated Mount Everest's height** and openly resisted colonial injustices.
- **Perception**: Described by missionary Alexander Duff as a "**new race of men**"; historian Rosinka Chaudhuri called them **India's "first radicals."**
- **Legacy and Intellectual Impact:**

- **Awakening**: Though short-lived, the movement sparked Bengal's intellectual revolution.
- **Seeds of Reform**: Laid foundation for later reformist and nationalist currents.
- **Independence of Mind**: Marked a sharp break from Macaulay's vision of Anglicised Indians — **Derozians** were assertive and original.

[UPSC 2021] Who among the following was associated as Secretary with Hindu Female School which later came to be known as Bethune Female School?
Options: (a) Annie Besant (b) Debendranath Tagore (c) Ishwar Chandra Vidyasagar * (d) Sarojini Naidu