Archaeological Survey of India (ASI) Under Scrutiny

What is ASI?

The **Archaeological Survey of India (ASI)**, functioning under the Ministry of Culture, serves as the country's apex institution for archaeological exploration, excavation, and monument preservation. Its key responsibilities include:

- Conducting excavations at historical sites.
- Protecting and restoring ancient monuments.
- Publishing excavation reports and research.
- Shaping the official archaeological discourse of India.
  Relevance: GS-1 (Culture & Heritage).

Keeladi Excavations

- **Location:** Vaigai river valley, near Madurai in Tamil Nadu.
- **Initiation:** Began in 2014.
- **Discoveries:**
  - Roughly **7,500 artefacts** found in early stages.
  - Evidence pointed to an **urban, literate, secular culture**.
  - Helped bridge the gap between the Iron Age (12th–6th BCE) and Early Historic Era (6th–4th BCE).
  - Linked to India's **second phase of urbanisation (6th–2nd BCE)**.
- **Significance:** Challenged the notion that urbanisation in India was solely a **north Indian phenomenon**, demonstrating the advancement of ancient Tamil society. Scholars began terming it the **"Vaigai Valley Civilisation."**

The Controversy

- **2017:** Lead archaeologist **K. Amarnath Ramakrishna** suddenly transferred to Assam—seen as an attempt to suppress findings.
- ASI **stopped further excavation**, citing lack of important discoveries.
- Political friction erupted between the Union Government and the Tamil Nadu state.
- **Judicial intervention:** The Madras High Court handed over excavation to the Tamil Nadu State Archaeology Department.
- **State-led work (2018 onwards):** Over **18,000 artefacts** unearthed.

Scientific Debate

- **2023 Report by Ramakrishna:** Validated earlier results with
    - **Stratigraphic analysis.**
    - **Material culture studies.**
    - **AMS dating techniques**, confirming antiquity of artefacts.
- **ASI's Reaction:** Called for the report's "revision," raising accusations of political bias.
- **Larger Issue:** Reflected **politicisation of archaeology** and a crisis of ASI's credibility.

Broader Trends in ASI's Functioning

a) Tamil Nadu Sites:

- **Adichanallur (Thoothukudi):** Excavated initially in 1900s, revived in 2004. Iron Age artefacts over **3,000 years old** discovered. Findings were held back for **15 years** and only released after court orders.
- **Sivagalai (Thoothukudi):** Faced similar neglect in timely publication.

b) Rajasthan Site (Bahaj Village):

- Unearthed a **23-metre deep paleochannel**, which ASI linked to the mythical **Saraswati River**.
- Report claimed connections to the **Mahabharata period**—criticised for **embracing mythological claims without adequate scientific evidence**.

Key Criticisms Against ASI

Institutional Issues:

- Arbitrary transfers and political interference (e.g., Keeladi).
- Chronic delays in releasing excavation reports.
- Over-reliance on **outdated Wheeler grid excavation system**.
- Lack of well-designed, comprehensive research frameworks.
- Closed internal review system—most findings remain in internal files rather than peer-reviewed journals.

Academic Critiques:

- **Ashish Avikunthak (2021):** Highlighted bureaucratic hurdles, weak infrastructure, and poor research environment.
- **Supriya Verma & Jaya Menon (2003):** Criticised Ayodhya excavation for lack of scientific rigour.
- **Dilip K. Chakrabarti & Jürgen Neuß:** Noted ASI's dependence on outdated practices and failure to provide holistic interpretations.

Global Comparison:

- Germany (DAI), France (INRAP), Japan (Agency for Cultural Affairs) → publish research in **global journals**, ensure **accountability** and **international visibility**.

Conceptual Critique – Methodological Nationalism

ASI is often accused of promoting a **state-approved, uniform history** of India. Features include:

- Giving preference to selected narratives of civilisational unity.
- Viewing history as a linear progression toward the present nation-state.
- Silencing **regional civilisational stories** like that of Tamil society.

Implications of the Crisis

- **Academic:** Loss of respect in international scholarly circles.
- **Political:** Intensifies **Centre–State frictions** (e.g., Tamil Nadu vs Union).
- **Cultural:** Erases India's pluralistic historical experiences in favour of homogenised versions.
- **Institutional:** Puts ASI's **scientific objectivity and legitimacy** in doubt.

Road Ahead

- **Institutional Reform:** Reduce political interference, make review and publications more transparent.
- **Modernisation:** Adopt advanced excavation methods such as **remote sensing and digital stratigraphy**.
- **Decentralisation:** Empower state archaeology departments for independent research.
- **Global Integration:** Publish results in peer-reviewed international platforms.
- **Acknowledgement of Diversity:** Recognise multiple regional civilisations rather than pushing a single monolithic narrative.
- **Capacity Building:** Provide archaeologists with better training, resources, and research infrastructure.

Indians Least Worried About Global Economy – PEW Survey

What is the Pew Research Center Survey?

The **Pew Research Center**, an independent US-based think tank, conducts worldwide opinion surveys on politics, social trends, and global issues.

- **2025 survey period:** 24–30 March 2025.

- **Coverage:** 25 countries, including India.
- **Comparisons made with previous surveys:** 2013, 2016, 2017, 2018, 2020, 2022.
- **Core focus:** Public perception of five major global threats:
    - Misinformation online.
    - Global economic risks.
    - Climate change.
    - Terrorism.
    - Infectious diseases.
      Relevance: GS-3 (Indian Economy).

Global Findings (25 Countries)

- **Misinformation Online:**
    - Seen as the **biggest threat** globally.
    - **72% median** labelled it a major risk.
    - Top-ranked threat in Germany, Netherlands, Poland, Sweden, UK, US, and South Korea.
- **Global Economy:**
    - **70% median** expressed concern.
    - For the first time since 2017, it surpassed climate change in perceived severity.
    - Anxiety driven by slowing global growth, US tariff measures, and ongoing conflicts.
- **Climate Change:**
    - Viewed as a **major threat by 67%**.
    - Political divisions apparent: left-leaning groups more worried than right-leaning ones.
    - Interestingly, **no country rated it as their top single threat.**
- **Terrorism:**
    - Concerned **69% of respondents**.
    - Higher in **middle-income nations (79%)** than high-income ones (60%).
    - Particularly worrisome for older citizens, less educated groups, and conservative sections.
- **Infectious Diseases:**

- Remains a prominent concern, especially in Argentina, Brazil, South Africa, and Mexico, where it ranked as the top fear.

India-Specific Findings

- **Terrorism:**
  - **79% Indians** identified it as a major threat—one of the **highest globally**, comparable to Israel, Nigeria, and Turkey.
- **False Online Information:**
  - Nearly **70% Indians** considered it a significant danger, close to global median.
- **Infectious Diseases:**
  - Around **70% saw it as a serious concern.**
- **Global Economy:**
  - Only **49% Indians** feared it as a threat—the **lowest across surveyed countries.**
- **Climate Change:**
  - Just **55% expressed concern**, also among the **lowest levels globally.**

Contrast with Advanced Economies

- Developed nations (US, UK, Japan, Germany etc.) are most concerned about:
  - **Misinformation and global economic downturns.**
  - Climate change worries are much stronger among left-leaning populations.
- **India's pattern differs:**
  - Security concerns (terrorism, diseases) dominate.
  - Lower anxiety about the economy and climate compared to the West.

Why India Responded Differently

- **Terrorism Concerns:**
  - Ongoing cross-border terrorism from Pakistan.
  - Spillover of instability from Afghanistan.
  - Domestic insurgencies in Kashmir and Naxal zones.
  - Media emphasis on security risks amplifies public fear.
- **Climate Change Concerns Lower:**

  - Seen as a remote, global issue with less immediate urgency.
  - Developmental needs—jobs, poverty eradication, economic growth—overshadow environmental anxieties.
  - Public awareness gap despite frequent disasters (floods, pollution, heatwaves).
- **Economic Concerns Lower:**
  - India's economy continues to grow at over **7%**, unlike global slowdowns.
  - Government messaging emphasises resilience and stability, reducing perceived risks.
- **Misinformation Concerns High:**
  - Rapid expansion of social media use.
  - Rise in fake news, election-related propaganda, and communal tensions.

Implications of Survey Results

For India:

- Indian citizens focus more on **immediate security concerns** than long-term systemic risks.
- Creates a **policy-populism gap**—government must act on climate and economy even though citizens downplay them.
- Urgent need to address misinformation with **digital literacy and stronger online regulation.**

For Global Governance:

- **Misinformation emerges as a universal challenge**—eroding trust in institutions and democracy.
- **Economic fears outranking climate change** may weaken commitments to global climate action (like COP agreements).
- Divergent perceptions between developed and developing nations make collective policymaking harder.

Way Ahead for India

- **National Security:** Continue bolstering counter-terrorism efforts.
- **Climate Awareness:** Link local disasters (heatwaves, floods, pollution) with climate change impacts.
- **Economic Resilience:** Maintain buffers against global shocks and improve communication about risks.

- **Digital Governance:** Invest in fact-checking, AI moderation, and stronger cyber laws.
- **Public Health Security:** Strengthen pandemic-preparedness infrastructure and disease monitoring systems.

Evolution of Deception in Modern Warfare

Basics: What Are Decoys in Military Strategy?

- **Definition:** Decoys are deliberately created **false objects, signals, or signatures** designed to mislead enemy sensors, radars, or decision-makers.
- **Traditional Role:** Used in earlier wars through camouflage, dummy weapons, and fake troop positions. (Example: Inflatable tanks during WWII).
- **Modern Transformation:**
    - **Electronic spoofing** in the digital era.
    - **Multi-spectrum deception** (radar, thermal, acoustic, infrared).
    - **Artificial Intelligence (AI)-driven decoys**.
- **Strategic Objective:**
    - Confuse or overload enemy targeting systems.
    - Force opponents to waste expensive weapons.
    - Shield high-value assets such as fighter jets, tanks, or warships.
    - Buy time for counterattack or tactical manoeuvre.
      Relevance: GS-3 (Internal Security & Defence).

India's Use of Decoys

1. Indian Air Force (IAF): Fibre-Optic Towed Decoy (FOTD) – X-Guard

- **Context:** Deployed during **Operation Sindoor** by Rafale fighter aircraft.
- **How it Works:**
    - Trails about **100 metres behind the aircraft**.
    - Mimics aircraft features like **Radar Cross-Section (RCS)**, Doppler speed, and electromagnetic profile.
    - Integrated with Rafale's **SPECTRA electronic warfare suite**.
    - Produces **360° jamming signals** to mislead enemy radars.
- **Operational Impact:**
    - Pakistan Air Force's J-10C jets mistook decoys for real Rafales.
    - Enemy wasted **PL-15E long-range missiles** on false targets.
    - Possibly led to **false victory claims** by adversary pilots.

- **Significance:**
    - First known operational use of **AI-enabled aerial decoys** by India.
    - Emergency procurement of more X-Guard units underway.

2. Indian Navy: Torpedo and Missile Decoys

- **Submarines (e.g., INS Karanj, Scorpene-class):** Equipped with torpedo decoys that generate **false acoustic signals** to divert incoming torpedoes.
- **Surface Warships:** Use **floating chaff, acoustic decoys, and active deception devices**.
- **Global Parallel:** Comparable to **Nulka decoy (Australia–US)** which projects a **radar signature mimicking a larger ship**, luring anti-ship missiles away.

3. Indian Army: Land-Based Decoys

- **Current Tools:** Inflatable tanks, radar-reflective shells, and dummy heat emitters resembling artillery or missile units.
- **Future Plans:**
    - In 2025, an RFI (Request for Information) sought advanced decoys imitating **T-90S/SK tanks**.
    - Requirements: Match physical dimensions, thermal and acoustic signals of real tanks.
    - Purpose: Deceive **drones, loitering munitions, and precision-guided missiles**.
- **Comparisons:**
    - **Russia:** Uses Inflatech technology to simulate entire armoured divisions.
    - **Ukraine:** Employs wooden/3D-printed decoys to drain Russian missile stockpiles.
    - **US:** Tested decoy vehicles against Javelin anti-tank systems.
    - **China:** Heavy investment in **camouflage and deceptive formations**.

Technical Insight: X-Guard FOTD System

- **Weight:** Roughly 30 kg, designed to be retractable and reusable.
- **Functionality:**
    - Projects a **false radar and velocity signature**, tricking sensors into believing it is a genuine aircraft.
    - Replicates Rafale's **onboard electronic countermeasure (ECM)** emissions.
    - Creates a convincing "ghost aircraft" both for human operators and AI-driven detection systems.

- **Integration:** Works with Rafale's **SPECTRA EW system**, which detects threats and manages jamming.
    - X-Guard serves as an **expendable shield**, taking the hit while protecting the main aircraft.

Importance of Decoys in 21st-Century Battlefields

- **Asymmetric Advantage:**
    - Decoys are inexpensive compared to real platforms.
    - They force adversaries to spend costly missiles and drones on false targets.
- **Multi-Domain Necessity:**
    - **Air:** Protects advanced fighter jets against radar-guided weapons.
    - **Land:** Shields tanks and artillery from loitering munitions and drones.
    - **Sea:** Diverts torpedoes and anti-ship missiles from submarines and warships.
- **Future Trajectory:**
    - AI-based **autonomous decoys**.
    - **Networked swarms** of aerial and maritime decoys working together.
    - Crucial in countering **mass drone and loitering munition attacks**.

Strategic Implications for India

- **Operational:** Improves survival rates of expensive platforms (Rafales, Scorpenes, T-90 tanks).
- **Economic:** Offers a **high-benefit, low-cost** method to protect assets.
- **Psychological:** Creates **fog of war**, undermining enemy confidence and planning.
- **Defensive Necessity:** Critical given the **advanced missile and drone arsenals** of China and Pakistan.
- **Industrial Opportunity:** Expands scope for indigenous R&D in decoy systems under **Atmanirbhar Bharat**.

Global Lessons for India

- **Ukraine:** Demonstrated how **cheap decoys can drain superior adversaries**.
- **US & Australia:** Use of **independent naval decoys (Nulka)** shows importance for sea survival.
- **Russia & China:** Mass deployment of decoy units creates **operational paralysis** for enemies.

Conclusion

Decoys have evolved from being **secondary camouflage tools** to becoming **core assets in modern warfare**, on par with firepower.
India's adoption of **X-Guard aerial decoys, naval torpedo defences, and land-based fakes** shows it has recognised their growing role.
Future conflicts will likely witness **AI-enabled decoy swarms**, making the line between real and fake assets increasingly blurred.

The 130th Constitutional Amendment Bill – Tackling Criminalisation of Politics

Context: Criminals in Politics

- **Definition:** Criminalisation of politics refers to individuals with criminal records entering legislatures or holding executive posts.
- **Magnitude (ADR Data):**
    - **46% of sitting MPs** and **45% of MLAs** face criminal charges.
    - Probability of winning an election: **15.4% for candidates with criminal cases vs 4.4% for clean candidates**.
- **Consequences:**
    - Weakens democracy and undermines the **rule of law**.
    - Encourages **money power and muscle power** in elections.
    - Fuels public mistrust in political institutions.
      Relevance: GS-2 (Polity & Constitution).

Current Legal Framework

Representation of the People Act (RPA), 1951

- **Section 8:** Disqualifies individuals convicted with a sentence of 2 years or more. Applies during the imprisonment term plus **6 years after release**.
- **Section 8(4):** Earlier allowed convicted MPs/MLAs to continue if an appeal was filed. **Struck down in the Lily Thomas case (2013)**.

Gap in Law:

- While MPs/MLAs can be disqualified as legislators, there is **no explicit rule preventing them from holding executive office** as ministers (PM/CM or cabinet members).

Provisions of the 130th Amendment Bill

- **Articles Affected:** 75 (Union Council of Ministers), 164 (State Council of Ministers), 239AA (Delhi NCT Government).

- **Key Changes:**
    - If a minister is **arrested and detained for 30 consecutive days** in a case carrying punishment of **5 years or more**, they must vacate office.
    - **Procedure:**
        - Removal based on advice of the PM/CM.
        - If advice not given, removal becomes **automatic on the 31st day**.
    - **PM/CM themselves:** Must resign if detained for 30+ days.
    - **Reappointment:** Once released, they may be reinstated.
    - **Extension:** Similar provisions for **J&K and Puducherry**.
- **Process:** As a **constitutional amendment**, requires **two-thirds majority** in both Houses.

Rationale Behind the Bill

- To ensure **serious offenders do not occupy executive positions**.
- Prevent misuse of state power by tainted ministers while investigations or trials are ongoing.
- Bring **executive disqualification in line with legislative disqualification** already in place under the RPA.

Issues and Criticism

1. **Challenge to Parliamentary Democracy:**
    - PM/CM must have discretion in selecting their council of ministers.
    - External restrictions may dilute this constitutional principle.
2. **Presumption of Guilt Before Trial:**
    - Disqualification occurs **without conviction**, merely due to 30-day detention.
    - Contradicts the principle of **"innocent until proven guilty."**
3. **Risk of Political Misuse:**
    - Police action could be weaponised against opposition leaders.
    - Especially sensitive in Centre–State conflicts (opposition-led states).
4. **Temporary Nature of Disqualification:**
    - Since ministers can be reappointed after release, deterrence is weak.
5. **Partial Solution:**
    - Addresses only those already in power.

- Does not prevent **political parties from nominating criminal candidates** in the first place.

Alternative Approaches & Reforms

- **Election Commission's 2016 Proposal:** Ban candidates from contesting once charges are framed in offences punishable by **5+ years**, subject to judicial screening.
- **Judicial Oversight:** An independent authority should review charges before disqualification to prevent misuse.
- **Political Party Responsibility:** Stop fielding candidates with criminal records.
  - **Supreme Court Judgments (2018, 2020):** Parties must publicly justify why they selected candidates with criminal cases.
- **Voter Awareness:** Strengthen affidavit disclosures (Form-26) for transparency.
- **Fast-Track Courts:** Dispose of pending cases against politicians swiftly to prevent long-term exploitation of legal loopholes.

Strategic Implications

- **Positive Aspects:**
  - Sends a symbolic message against corruption.
  - May improve **executive accountability**.
- **Negative Aspects:**
  - Could disturb **federal balance** by empowering the police to destabilise governments.
  - May encourage **political vendetta arrests**.
  - Limited impact if criminal elements continue to contest elections.

Conclusion

The **130th Amendment Bill** reflects India's determination to tackle criminalisation in governance. However, by relying on **detention-based disqualification**, it risks **constitutional overreach** and possible misuse.

Real reform should focus on **keeping criminal candidates out of politics from the start**, rather than only removing them once they assume power.

A **balanced solution** requires:

- Judicial safeguards against arbitrary arrests.
- Stricter responsibility on political parties.
- Electoral reforms for candidate screening.

- Stronger institutional mechanisms (ECI, judiciary).

Only a **systemic clean-up of candidate selection** will truly curb criminalisation, not piecemeal executive disqualifications.

ISRO Conducts Air-Drop Test for Gaganyaan Mission

Gaganyaan – India's First Human Spaceflight Project

- **Objective:** To send an Indian crew into space for the first time.
- **Mission Profile:**
    - A three-member astronaut team to be placed in **Low Earth Orbit (~400 km altitude)**.
    - Duration of mission: **3 days**, followed by safe return to Earth.
- **Stakeholders:** Indian Space Research Organisation (ISRO) in collaboration with the Indian Air Force, Navy, Coast Guard, and DRDO.
- **Timeline:** Multiple preparatory trials underway before the manned launch.
  Relevance: GS-3 (Science & Tech – Space).

What is the IADT (Integrated Air Drop Test)?

- **Purpose:** A full demonstration of the **parachute-based recovery system** designed for the crew module.
- **Significance:** Recovery and safe landing are among the riskiest phases of human spaceflight.
- **Process:**
    - A **dummy crew capsule (weighing ~5 tonnes)** was lifted by an Indian Air Force Chinook helicopter.
    - Released at a few kilometres altitude.
    - **Drogue parachutes** opened first for stability, followed by the **main parachutes**.
    - This slowed the capsule to a safe speed for **splashdown in the sea.**

Critical Systems in the Mission

1. **Crew Module (CM):**
    - Designed to house astronauts securely.
    - Requires controlled re-entry and descent.
2. **Parachute Recovery System:**
    - Built with redundancy—multiple parachutes to ensure safe deceleration.

3. **Crew Escape System (CES):**
    - Consists of five types of solid-fuel motors.
    - Ensures astronauts can be ejected safely if launch fails.
4. **Environmental Control & Life Support System (ECLSS):**
    - Provides breathable air, temperature regulation, and pressure control inside the capsule.

Importance of IADT-1

- **Validation:** Confirms the reliability of parachute-based recovery under near-real conditions.
- **Human-Rating Step:** Essential before astronauts can fly, ensuring all systems meet **safety standards**.
- **Cross-Agency Coordination:** Showcases cooperation between ISRO, IAF, DRDO, Navy, and Coast Guard for recovery operations.
- **Readiness of Infrastructure:** Training centres, control rooms, and modified launch pads are already in place.

Why the Recovery Phase is High Risk

- **Re-entry Challenges:** Crew module re-enters atmosphere at **7–8 km/s**, facing extreme heat → requires strong heat shields.
- **Descent Dynamics:** Speed must reduce drastically to ensure safe landing.
- **Splashdown Accuracy:** Capsule must land in pre-marked zones in the sea for Navy recovery teams.
- **Crew Safety:** Any failure in parachutes or life-support systems can jeopardise astronaut survival.

Preparations Before the Human Mission

- **Unmanned Tests:** Multiple test-vehicle flights for escape systems and abort scenarios.
- **Pad Abort Trials:** To validate escape reliability during launch failure.
- **IADT Series:** Several such tests planned under different conditions.
- **Orbital Module Facility:** For assembly of crew and service modules.
- **Astronaut Training:**
    - Basic training in Russia.
    - Advanced mission-specific training in Bengaluru.

Strategic Importance of Gaganyaan

- **India's Entry to Human Spaceflight Club:** Joins the US, Russia, and China.
- **Boost to Indigenous Technology:** Development of parachutes, escape systems, and life-support modules using local expertise.
- **Spinoff Benefits:** Innovations in re-entry technology, aerospace systems, and potential for **space tourism and lunar missions**.
- **Prestige & Soft Power:** Enhances India's reputation as a global space leader.

Cryptocurrency: Unlocking the Digital Vaults

What is Cryptocurrency?

- **Etymology:** From the Greek *kryptos* meaning "hidden" or "secret."
- **Definition:** A purely digital or virtual currency secured through cryptography.
- **Nature:**
    - Exists only in digital form (no physical coins/notes).
    - Stored in digital wallets (hardware or software).
    - Functions outside the control of regulators like RBI, SEBI, or any government → **decentralised**.
    - Transactions occur directly between users (**peer-to-peer**) without intermediaries like banks.
- **Examples:** Bitcoin, Ethereum, Solana.
  Relevance: GS-3 (Economy – Currencies).

Difference from Traditional Currency

- **Traditional Money:**
    - Managed by central banks (e.g., RBI, Federal Reserve).
    - Exists in both physical and electronic forms.
    - Requires banks/payment gateways for transactions.
    - Transactions reversible/alterable.
- **Cryptocurrency:**
    - No central authority.
    - Exists only digitally.
    - Transactions irreversible and permanently recorded.
    - Operates on **blockchain technology**.

Blockchain – The Core of Crypto

- **Definition:** A decentralised, distributed digital ledger recording every transaction of a cryptocurrency.
- **Analogy:** Works like a **global accountant's notebook** or **Google Sheet shared by everyone**.
    - Each block = a page filled with verified transactions.
    - Once sealed with a unique code (hash), it is permanently linked to the next → forming a chain.
- **Features:**
    - **Transparency:** Open for anyone to verify.
    - **Immutability:** Past records cannot be deleted or altered.
    - **Security:** Validated by multiple computers (nodes).
    - **Decentralisation:** No single authority in control.

How a Transaction Works

1. User A (Ram) sends crypto to User B (Shyam).
2. Transaction grouped into a block with other transactions.
3. Network nodes verify it cryptographically.
4. Block sealed with a hash and added to blockchain.
5. Updated ledger shared across the network instantly.
   Analogy: A shared Google Sheet → anyone can add but no one can delete old entries.

Why People Invest in Crypto

- Potential for **very high returns** (e.g., Bitcoin's rise since 2009).
- **Borderless:** Works internationally without banking restrictions.
- **Transparency & Security:** Immutable records.
- **Diversification:** Alternative asset class beyond gold, real estate, stocks.
- **Utility:** Used in payments, smart contracts (Ethereum), NFTs, DeFi.

Risks and Challenges

- **Volatility:** Prices fluctuate dramatically (e.g., Bitcoin crash >70% in 2022).

- **Regulatory Uncertainty:** Many countries still evolving crypto laws.
- **Security Threats:** Hacks, phishing, wallet thefts.
- **No Consumer Protection:** No safety net unlike bank deposits.
- **Speculative:** Many investors lack knowledge, treating it like gambling.

Cryptocurrency in India

- **Adoption:** Millions of Indians already hold crypto assets.
- **Use Cases:** Limited acceptance for payments globally.
- **Regulation:**
    - Not legal tender in India.
    - **30% tax on crypto gains** (Union Budget 2022).
    - **1% TDS on transactions.**
- **Future:** India is exploring a **CBDC (Central Bank Digital Currency)** as a regulated digital alternative.

Blockchain Beyond Cryptocurrency

Applications extend to:

- **Banking & Finance:** Faster settlement.
- **Supply Chains:** Tracking authenticity.
- **Healthcare:** Secure digital patient records.
- **Governance:** Land registries, digital voting.
- **Digital Economy:** NFTs, Metaverse ownership.

Invasive Alien Species (IAS) – An Underestimated Threat

What Are Invasive Alien Species?

- **Definition:** Non-native organisms (plants, animals, microbes) that spread in new ecosystems, often outcompeting local species.
- **Pathways:** Global trade, shipping (ballast water), tourism, farming, aquaculture, ornamental plants.
- **Examples in India:** Lantana camara, Prosopis juliflora, Parthenium (Congress grass), African catfish, Golden apple snail.
  Relevance: GS-3 (Environment & Ecology).

Key Findings (Nature Ecology & Evolution Study, 2025)

- **Global Economic Cost (1960–2022):** Over **$2.2 trillion**.
- **True Costs Likely Higher:** Actual expenditure could be **16 times more**.
- **Regional Estimates:**
    - Europe: $1.5 trillion (71% of global total).
    - North America: $226 billion.
    - Asia: $182 billion.
    - Africa: $127 billion.
    - Oceania: $27 billion.
- **India:**
    - No precise figure but among worst underreporting cases.
    - Recorded vs actual spending difference: **1.16 billion %**.

Major Invaders

- **Plants:** Caused $926 billion in damages (1960–2022).
    - Lantana camara: spreads in forests (e.g., Bandipur NP), increases fire hazards.
    - Japanese knotweed: extremely expensive to eradicate.
- **Arthropods:** Insects, spiders → $830 billion losses.
- **Mammals:** $263 billion damages.

Impacts of Invasive Species

- **Economic:** Crop yield losses, forestry destruction, fire risks, control costs.
- **Ecological:** Native species displaced, soil/water chemistry altered, biodiversity loss.
- **Social:** Threats to food security, health issues (e.g., Parthenium allergies), added burden on developing economies.

Why India Underreports Costs

- Absence of centralised data.
- Poor coordination between departments (forests, agriculture, fisheries, environment).
- Limited funding for monitoring.
- Local-language studies not integrated into global databases.

- Focus diverted to other priorities (tigers, afforestation).

Policy & Management Strategies

- **Global Frameworks:**
    - Ballast Water Management Convention.
    - Convention on Biological Diversity (CBD).
- **Responses:**
    - **Prevention:** Quarantine and strict import checks.
    - **Eradication:** At early stages.
    - **Control & Suppression:** Removal campaigns, biological control.
    - **Slow Spread:** Awareness, buffer zones.

India-Specific Needs:

- Centralised **national invasive species database**.
- Integration into **National Biodiversity Action Plan**.
- Stronger quarantine laws.
- Regional cooperation to tackle cross-border invasions.

Integrated Air Defence Weapon System (IADWS)

Basics

- **Air Defence Systems:** Detect, track, intercept aerial threats (missiles, UAVs, aircraft).
- **IADWS:** Multi-layered defence system under **Mission Sudarshan Chakra** by DRDO.
- **First successful trial:** Off Odisha coast, 24 August 2025.
- **Target:** Full operational capacity by 2035.
  Relevance: GS-3 (Defence, S&T).

Components

- **QRSAM (Quick Reaction SAM):** Mobile, short-to-medium range missile.
- **VSHORADS (Very Short Range ADS):** Man-portable, ideal for low-flying threats.
- **Directed Energy Weapons (DEW):** Laser-based systems for jamming or destroying targets.
- **Surveillance & Cyber Systems:** Networked radars integrated with cyber defence.

Why India Needs It

- Rising threats from drones, hypersonic missiles, stealth aircraft.
- China & Pakistan both expanding missile/UAV arsenals.
- Vital to protect cities, defence bases, nuclear facilities.

Significance

- **Security:** Multi-layered shield for critical assets.
- **Strategic Autonomy:** Reduces dependence on imports (e.g., Russian S-400).
- **Technological Leap:** AI, laser weapons, network-centric warfare.
- **Private Sector Role:** Involvement of domestic companies boosts **defence ecosystem**.

Challenges

- Complexity of integrating lasers, radars, missiles.
- Huge financial costs.
- Timelines (2035) may face delays.
- Adversary countermeasures (hypersonics, decoys).

India and Global Dairy Sector

Basics

- **India's Role:** World's largest milk producer (22% of global output).
- Smallholder-driven sector (unlike mechanised Western farms).
- Cooperatives (e.g., Amul) dominate procurement and marketing.
  Relevance: GS-3 (Agriculture).

Global Dairy Trade

- **Exporters:** US, EU, New Zealand, Australia.
- **Importers:** China, SE Asia, Middle East.
- **India:** Mostly self-reliant, minimal exports.

Price Competitiveness

- **Feed Cost Advantage (US):** Maize at ₹15/kg vs ₹22–23/kg in India.

- **Milk Prices:** Comparable—India's farm-gate price ~₹34/litre (Maharashtra).
- **Reason:** Dependence on unpaid family labour reduces costs in India.

Efficiency and Value Chain

- **Farmer Returns:** 55–57% of consumer price in Gujarat (higher than US 35%).
- **Processing:** Cooperatives add value (cheese, ghee, butter).
- **Logistics:** Integrated procurement and marketing improves efficiency.

Challenges

- Low productivity (India's ~1,800 litres/cow/year vs >10,000 litres in US/NZ).
- Scarcity of quality fodder.
- Fragmented, small herds.
- Labour-intensive milking.
- Water-intensive, vulnerable to climate change.

Big Picture

- **Strengths:** Largest producer, cooperative model, high farmer share.
- **Weaknesses:** Productivity gap, dependence on cheap labour.
- **Opportunities:** Genetic improvement, mechanisation, hydroponic fodder, value-added exports.
- **Threats:** WTO pressure, cheap imports, climate stress, rising wages eroding low-cost model.

Arctic Sea Ice Melting – Why Slower Loss is Not Good News

Basics

- **Arctic Sea Ice:** Frozen seawater in Arctic Ocean. Expands in winter, shrinks in summer.
- **Significance:** Reflects sunlight (albedo effect), regulates climate, sustains ecosystems.
  Relevance: GS-3 (Environment).

Study Findings

- Conducted by researchers (Univ. of Exeter, Columbia Univ., UC Irvine).

- **Since 1980s:** Significant decline.
- **2003–2022:** Rate of loss slowed to **3.1 lakh sq km per decade** (down from 8.3 lakh sq km earlier).
- **Cause:** Natural variability, not reduced global warming.

Why the Slowdown Isn't Good News

- **Temporary Pause:** Does not signal recovery; ice is still thinning and fragile.
- **Masking Effect:** Variability (PDO, AMV, ENSO) temporarily offset warming.
- **Not Policy Impact:** Slowdown unrelated to CO_2 reduction → climate inaction remains dangerous.

Future Risks

- Once natural variability shifts, **rapid melting may resume**.
- May trigger feedback loops (methane release, monsoon disruptions, jet stream shifts).
- Arctic warms **2–4x faster** than global average.
- Possible tipping point beyond which recovery is impossible even with emission cuts.

Implications

- **Science:** Models must account for natural variability.
- **Policy:** Must not misinterpret slowdown as success.
- **Global Climate:** Rapid collapse may disrupt AMOC, monsoons, and raise global temperatures.

26th August 2025: Daily MCQs

1. Question

Which of the following statements best describes the concept of negative liberty?

(a) The freedom to pursue one's own goals and interests

(b) The absence of external constraints or interference

(c) Exercising liberty to pursue negative goals

(d) The right to equal treatment under the law

Answer: (b)

Explanation:

• Negative Liberty (also known as “freedom from”) emphasizes the absence of external constraints or interference in one’s actions.

• Positive Liberty (also known as “freedom to”) emphasizes the presence of opportunities for an individual to achieve their goals.

• Liberty conceived by the Preamble or Fundamental Rights is not absolute but qualified.

• The ideals of liberty, equality, and fraternity in our Preamble were inspired by the French Revolution (1789-1799).

2. Question

Which of the following statements can be indirectly inferred from the Preamble of the Indian Constitution?

1. The Government of India holds ultimate decision-making power.

2. The Government of India has exclusive control over land ownership.

How many of the above statements are correct?

(a) 1 only

(b) 2 only

(c) both 1 & 2

(d) None

Answer: (c)

Explanation:

• The term ‘Sovereign’ in the Preamble indicates that India is an independent state with complete decision-making authority, free from external control. Therefore, Statement 1 is correct.

• Indian socialism supports a mixed economy where both the public and private sectors coexist. Consequently, the Government of India holds regulatory authority over land ownership, making Statement 2 correct.

3. Question

Under which Article of the Indian Constitution is the Right to Information (RTI) derived?

(a) Article 14

(b) Article 19

(c) Article 21

(d) Article 32

Answer: (b)

Explanation:

The Right to Information is derived from Article 19(1)(a) of the Indian Constitution, which guarantees the right to freedom of speech and expression.

• The Supreme Court of India in the case of State of Uttar Pradesh v. Raj Narain (1975) interpreted this right to include the right to access information, forming the basis for the enactment of the Right to Information Act, 2005.

• This Act ensures transparency and accountability in governance by providing citizens with access to information held by public authorities.

4. Question

Consider the following statements:

1. The Parliament of India consists only of the Lok Sabha and the Rajya Sabha.

2. The concept of a parliamentary government in India is borrowed from the British Constitution.

Which of the above statements is/are correct?

(a) Only 1

(b) Only 2

(c) Both 1 and 2

d) Neither 1 nor 2

Answer: (b)

Explanation:

• The Parliament of India consists of the President, the Lok Sabha (House of the People), and the Rajya Sabha (Council of States). Therefore, Statement 1 is incorrect.

• The parliamentary system of government in India is adopted from the British Constitution, which includes features like a dual executive and collective responsibility of the Cabinet. Statement 2 is correct.

5. Question

Consider the following statements:

1. Article 352 deals with national emergency.

2. India has faced two financial emergencies.

3. During an emergency period, the federal structure converts to a unitary structure.

Which of the above statements is/are correct?

(a) Only one (b) Only two (c) All three (d) None

Answer: (b)

Explanation:

• Correct: Article 352 of the Indian Constitution deals with the proclamation of a national emergency.

• Incorrect: India has never faced a financial emergency. Although provisions for it exist under Article 360, no financial emergency has ever been declared.

• Correct: During an emergency period, particularly a national emergency under Article 352, the federal structure becomes more unitary in nature, with greater centralization of powers.