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YOUR PATHWAY TO UPSC SUCCESS

WEEKLY CURRENT AFFAIRS

8TH JAN TO 13TH JANUARY

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01 INDIA–GERMANY STRATEGIC PARTNERSHIP: 25 YEARS OF TIES, 75 YEARS OF DIPLOMACY

IN NEWS

- **India** and **Germany** have given **fresh momentum to their strategic partnership** during the **German Chancellor's visit to India**, marking:
  - **25 years of Strategic Partnership (since 2000)**
  - **75 years of diplomatic relations (since 1951)**
- The visit reaffirmed cooperation in **green transition, defence, technology, trade, mobility, education, and global governance**, underscoring Germany's role as **India's most important partner in the European Union**.

UPSC RELEVANCE

- **GS2:** International Relations, Strategic Partnerships, Global Governance
- **GS3:** Trade, Technology, Climate Change, Defence Cooperation
- **GS4:** Values-based diplomacy, multilateralism
- **Prelims:** India–Germany relations, EU partnerships, climate diplomacy.

BACKGROUND & CONTEXT (HISTORICAL PERSPECTIVE)

A. EARLY DIPLOMATIC FOUNDATIONS

- Diplomatic relations established in **1951**, soon after India's independence.
- Germany supported India's:
  - Industrial development
  - Technical education
  - Infrastructure building

B. STRATEGIC PARTNERSHIP (2000)

- Elevated to **Strategic Partnership in 2000**, reflecting:
  - End of Cold War realignments
  - Germany's growing global role
  - India's economic liberalisation

C. INSTITUTIONALISATION OF TIES

- **Intergovernmental Consultations (IGC)** launched in **2011**, unique to Germany:

- Only a few countries enjoy this format
- Involves heads of government + key ministers

- Signifies **high political trust and structured cooperation**.

D. CONTEMPORARY CONTEXT

- Global disruptions:
  - Climate crisis
  - Supply chain vulnerabilities
  - Geopolitical fragmentation
- India and Germany see each other as:
  - **Reliable partners**
  - **Like-minded democracies**
  - **Rule-based international order supporters**

KEY OUTCOMES OF THE GERMAN CHANCELLOR'S VISIT TO INDIA?

- Defence Industrial Cooperation: A joint roadmap was agreed to promote defence co-development, co-production, and technology partnerships, with Germany committing to faster export clearances.
  - Germany expressed its intent to participate in Indian naval and air exercises such as MILAN, the Indian Ocean Naval Symposium, and Tarang Shakti.
- In addition, both sides established a Track 1.5 Foreign Policy and Security Dialogue, enabling structured yet informal interactions between government officials and non-governmental experts to enhance strategic understanding and policy coordination.
- Visa-free Airport Transit: Indian passport holders will be allowed visa-free transit through German airports, easing travel and mobility.
- Education and Skilling: A higher education roadmap was adopted, German universities were invited to open campuses in India, and a Centre of Excellence for Renewable Energy skilling was announced.
- Critical Minerals and Semiconductors: Both sides agreed to cooperate on critical minerals and semiconductor ecosystems to strengthen supply-chain resilience.
- Digital and Emerging Technologies: The Indo-German Digital Dialogue work plan (2026–27) was finalised, covering AI, data governance, telecom, and Industry 4.0.

- Indo-Pacific and Connectivity cooperation: A bilateral dialogue mechanism on the Indo-Pacific was launched to support a rules-based regional order.
- Reaffirmed commitment to a free and open Indo-Pacific and support for the India–Middle East–Europe Economic Corridor (IMEC).
- Global Governance Reforms: India and Germany reaffirmed their commitment to reforming global institutions, including the UN Security Council, through the G4 framework.
- Counter-terrorism Cooperation: India and Germany condemned all forms of terrorism, including cross-border terrorism, reaffirmed cooperation against United Nations-designated terrorist groups under the 1267 regime, welcomed Mutual Legal Assistance Treaty ratification, and agreed to deepen intelligence sharing, legal cooperation, and action against terror financing and safe havens.

WHAT ARE THE KEY FACETS OF INDIA–GERMANY RELATIONS?

- Economic and Commercial Relations: Bilateral trade in goods and services between India and Germany crossed USD 50 billion in 2024, accounting for over 25% of India–EU trade.
    - Germany emerged as India's 8th largest trading partner in 2024–25, while India was Germany's 23rd largest trading partner in 2024, reflecting deepening economic integration.

- The Make in India Mittelstand (MIIM) programme supports German SMEs and family-owned businesses to invest and manufacture in India.
- Development Cooperation: Under the Green and Sustainable Development Partnership, Germany has committed €1 billion annually till 2030 to support climate action, renewable energy, sustainable urban development, water, forests, and agriculture.
- Both countries also cooperate through Triangular Development Cooperation to implement development projects in third countries aligned with the SDGs.
- Defence: India–Germany defence cooperation is anchored in the 2006 Defence Cooperation Agreement and its 2019 implementation arrangement, supported by regular high-level defence dialogues.
- Military ties have deepened through naval port calls, PASSEX exercises. Air force cooperation has expanded via Exercise Tarang Shakti, reflecting growing interoperability and strategic trust.

WHAT ARE THE CHALLENGES IN INDIA–GERMANY RELATIONS?

- **Divergence on Russia and Strategic Autonomy:** Germany expects closer alignment on the Russia–Ukraine conflict, while India continues to pursue strategic autonomy, including energy and defence ties with Russia, limiting full political convergence.
- **Asymmetry in Defence Cooperation:** Defence ties are improving but remain constrained by India's long-standing dependence on Russian equipment, higher costs and conditionalities of German defence exports, and slow finalisation of major deals (e.g. submarines).
- **Uneven Scale of Economic Engagement:** Despite growth, bilateral trade is modest compared to Germany–China trade, creating a gap between Germany's diversification ambitions and the current depth of India–Germany economic integration.
    - Germany increasingly views China as a systemic economic rival, whereas India sees China as a direct security and territorial threat, leading to differences in threat perception that constrain deeper strategic alignment in the Indo-Pacific.
- **Slow Progress on India–EU Trade Framework:** Prolonged negotiations on India–EU Free Trade Agreement create uncertainty for long-term investment and supply-chain planning, affecting bilateral momentum.
- **Migration and Integration Challenges:** Although skilled migration and student mobility are rising, issues such as language barriers, recognition of qualifications, and social integration persist.

WHAT STEPS CAN ENHANCE INDIA-GERMANY RELATIONS?

- **Accelerate Economic and Trade Integration:** Push for early conclusion of the India–EU Free Trade Agreement, simplify regulatory processes, and strengthen supply-chain partnerships to reduce overdependence on China.
- **Enhance Climate and Green Transition:** Leverage the GSDP for green hydrogen, renewable energy, sustainable mobility, and climate-resilient infrastructure.
- **Promote SME and Mittelstand engagement:** Expand programmes like Make in India Mittelstand to attract German SMEs into Indian manufacturing and innovation ecosystems.
    - This would reduce Europe's China-dependence while embedding India deeper into EU-centric value chains, especially for ASEAN and Africa-facing exports.
- **Build a Shared Normative Alternative in Global Governance:** India and Germany should jointly champion a value-based yet non-coercive model of global governance that is democratic, inclusive, development-oriented, and respectful of sovereignty and diversity.
    - Such an approach would offer a credible alternative to both authoritarian revisionism and Western unilateralism, while enhancing their standing as responsible and stabilising global stakeholders.
    - Scale up India–Germany Triangular Development Cooperation in Africa and Latin America in sectors like renewable energy, healthcare, skilling, and digital public infrastructure.
- **Digital Public Infrastructure:** Promote interoperability between India's Digital Public Infrastructure (Aadhaar-like platforms, UPI, ONDC) and EU digital governance frameworks through the Indo-German Digital Dialogue.

02 GOLDEN TEMPLE'S RESTORATION OF A 200-YEAR-OLD PAINTING OF GURU GOBIND SINGH

IN NEWS

- The **Golden Temple** has commissioned **master artists from the Kangra region**—the cradle of **Pahari miniature painting**—to restore a **nearly 200-year-old painting of Guru Gobind Singh**.
- The restoration uses **traditional techniques, handmade tools, and natural pigments**, rejecting synthetic materials to preserve **historical, material, and spiritual authenticity**.

UPSC RELEVANCE

- **GS1:** Indian Art & Culture, Heritage Conservation, Miniature Painting Schools
- **GS2:** Cultural Institutions, Soft Power, Community-led Heritage
- **GS4:** Ethics of conservation, inter-generational responsibility
- **Prelims:** Pahari painting, Kangra school, Sikh Gurus, traditional pigments

BACKGROUND & CONTEXT

India's civilisational heritage is preserved not only through monuments and texts but also through **sacred art**, which blends **spirituality, aesthetics, and cultural memory**. Religious institutions like the Golden Temple have historically acted as **custodians of art, manuscripts, and paintings**, many of which are centuries old.

The painting of **Guru Gobind Singh**, dating back nearly **two centuries**, is a significant example of early Sikh-era devotional art. Over time, such artworks face deterioration due to:

- Humidity and environmental exposure
- Ageing of organic pigments
- Inappropriate modern restoration attempts

Recognising that **heritage conservation must respect original materials and techniques**, the Golden Temple authorities chose artists from **Kangra (Himachal Pradesh)**—a region internationally known as the **birthplace of refined Pahari miniature painting**.

This approach aligns with global best practices in conservation, which emphasise:

- Minimum intervention

- Authentic materials
- Continuity of traditional knowledge

The initiative also highlights a broader cultural trend: **reviving traditional Indian art forms not as museum relics, but as living traditions**.

HISTORICAL & CULTURAL CONTEXT

SACRED ART AS LIVING HERITAGE

- In Indian civilisation, sacred art is not merely decorative; it is:
  - A **vehicle of devotion**
  - A **medium of historical memory**
  - A **tool of moral instruction**
- Sikh religious spaces historically preserved:
  - Manuscripts (Janamsakhis)
  - Paintings of Gurus
  - Calligraphic art

The painting of Guru Gobind Singh belongs to this **continuum of devotional visual culture**, reflecting how Sikh history was transmitted visually before mass literacy.

THE 19TH CENTURY CONTEXT OF THE PAINTING

- Circa early 1800s:
  - Sikh Empire under Maharaja Ranjit Singh fostered art, architecture, and religious patronage.
  - Interaction between:
    - Sikh courts
    - Hill states
    - Pahari artists displaced by political changes
- Many Pahari painters migrated and worked for:
  - Sikh patrons
  - Gurudwaras
  - Regional courts

Thus, Pahari influence in Sikh iconography is historically authentic, not an anachronism.

THE ARTWORK: ARTISTIC, HISTORICAL & SPIRITUAL LAYERS

ICONOGRAPHY OF GURU GOBIND SINGH

- Depicted as:
    - **Saint-warrior (Sant-Sipahi)**
    - Spiritual authority + temporal courage
- Common visual elements:
    - Regal posture
    - Weapons symbolising righteousness
    - Calm, resolute facial expression

These images were meant to **inspire moral courage and collective identity**, especially during periods of persecution.

ARTISTIC CHARACTERISTICS OF THE PAINTING

- Fine line work
- Balanced composition
- Use of soft natural colours
- Harmony between figure and background

These features strongly align with **late Kangra aesthetics**, which emphasised:

- Emotional subtlety
- Inner spirituality
- Natural harmony

WHAT IS MINIATURE PAINTING?

These are small, detailed paintings typically no larger than 25 square inches, with subjects painted at 1/6th of their actual size. The traditional tempera technique is used, involving pigments mixed with water and an emulsion (typically egg yolk).

Common features include bulging eyes, pointed noses, and slim waists. Artists used brushes with a single bristle for fine details.

- **School/Styles of Miniature Painting:**
    - **Pala School of Art (750–1150 AD):** Among the earliest examples from eastern India, patronized by Buddhist and Vajrayana School rulers. Characterized by sinuous lines and subdued tones on palm leaf or vellum paper.

    - **Apabhramsa School of Art:** The Western Indian counterpart, from Gujarat and Mewar, Rajasthan. Initially focused on Jain themes, later included Vaishnava subjects and Gita Govinda.
    - Known for fish-shaped bulging eyes, pointed nose, and double chin.
- **Delhi Sultanate Period:** Developed an Indo-Persian style, drawing from Iranian and Jain traditions. Centres included Mandu and Jaunpur. Preceded the major Mughal, Rajput and Deccan styles.
    - **Mughal Era Miniature Painting:** Introduced a Persian-inspired style, shifting focus to secular themes like court scenes and hunting. A key contribution was the technique of foreshortening (look closer and smaller than they really are).
    - **Akbar:** Founded Tasvir Khana. Blended Persian and Indian styles. Illustrated manuscripts like Tutinama and Hamzanama.
    - **Jahangir:** Peak of naturalism, emphasis on flora and fauna portraits. Artist Ustad Mansoor was famous.
    - **Shah Jahan:** Introduced European influence, pencil sketching, and extensive use of gold and silver.
- **Rajput Schools:** Includes Mewar, Kishangarh, Bundi, Amber-Jaipur, and Marwar. Themes from Ramayana, Mahabharata, Bhagavata Purana, and Ragamala (Garland of Ragas).
    - **Mewar:** Dominated by painter Sahibdin. Known for Ragamala paintings.
    - **Kishangarh:** Associated with Raja Savant Singh and Bani Thani, painted by Nihal Chand.
    - **Pahari School:** From the Himalayan states (Jammu, Basholi, Kangra).
    - **Basholi School:** Characterized by bold lines and glowing primary colors like red and yellow, it depicts themes from the Rasamanjari and Ramayana.
    - **Guler–Kangra School:** Known for its delicate naturalism and romantic Krishna themes, it illustrates subjects like the Gita Govinda, Bhagavata Purana, Nal-Damayanti, and Baramasa.
    - **Kullu-Mandi School:** Folk style with bold drawing and dark colours.
- **Colonial and Modern Developments:**
    - **Company Paintings:** Blend of Rajput, Mughal, Indian styles with European realism; commissioned by British officials.

- **Bengal School of Art (early 20th century):** Reactionary movement against colonial art, used simple colours.
- **Materials & Themes:** Early works on palm leaves, later on paper. Used natural pigments, including lapis lazuli. Served as illustrations for texts (epics, fables, religious texts) and depicted court life, portraiture, and romantic legends.

PAHARI MINIATURE PAINTING: ADVANCED ART-HISTORICAL ANALYSIS

WHAT MAKES PAHARI PAINTING UNIQUE

- Emerged in **sub-Himalayan hill states**.
- Unlike Mughal miniatures (imperial, courtly):
  - Pahari paintings are **intimate, lyrical, and devotional**.
- Unlike Rajasthani paintings (bold, geometric):
  - Pahari works are **soft, fluid, and emotive**.

EVOLUTION OF THE KANGRA SCHOOL

- Originated from **Guler school**.
- Reached artistic zenith under **Raja Sansar Chand of Kangra**.
- Distinguishing features:
  - Delicate female figures
  - Naturalistic landscapes
  - Subtle shading
  - Refined facial expressions

MATERIALS & TECHNIQUES (HIGHLY IMPORTANT FOR PRELIMS)

PIGMENTS

- Blue → Lapis lazuli
- Red → Geru, cinnabar
- Yellow → Peori stone
- White → Ground conch shell
- Gold → Gold leaf/dust

BINDERS

- Gum arabic

- Plant resins

BRUSHES

- Made from squirrel or goat hair
- Allow ultra-fine detailing

Modern paints **cannot replicate ageing patterns or optical depth** of these materials.

CONSERVATION SCIENCE: WHY TRADITIONAL RESTORATION MATTERS

PRINCIPLES OF ETHICAL CONSERVATION

Global conservation ethics (ICOM, UNESCO) stress:

- **Authenticity** – Preserve original materials
- **Minimum intervention** – Do not overpaint
- **Reversibility** – Future corrections must be possible
- **Documentation** – Every step recorded

The Golden Temple's approach conforms to best international standards.

PROBLEMS WITH MODERN RESTORATION

- Chemical pigments:
  - Alter colour tone over time
  - Damage original layers
- Industrial solvents:
  - Weaken old paper
  - Accelerate deterioration

Traditional methods age **organically**, maintaining visual continuity.

SIKH HERITAGE & VISUAL CULTURE (OFTEN OVERLOOKED AREA)

EARLY SIKH ART

- Initially discouraged idol worship, but:
  - Visual depictions of Gurus emerged for teaching and remembrance
- Influenced by:
  - Mughal portraiture
  - Rajput-Pahari styles

GURU GOBIND SINGH AS CULTURAL SYMBOL

- Embodied:
  - Resistance to injustice
  - Moral sovereignty
- Art depicting him:
  - Reinforced Khalsa identity
  - Preserved collective memory during turbulent times

INSTITUTIONAL ROLE OF THE GOLDEN TEMPLE

BEYOND A RELIGIOUS SITE

- Functions as:
  - Cultural archive
  - Social institution
  - Living heritage space

COMMUNITY-LED CONSERVATION

- Unlike state-led ASI projects:
  - Restoration here is **faith-driven yet scholarly**
- Demonstrates how **religious institutions can responsibly safeguard heritage**.

CONTEMPORARY SIGNIFICANCE (MAINS ANALYSIS)

REVIVAL OF INTANGIBLE CULTURAL HERITAGE

- Skills of pigment preparation
- Traditional brush-making
- Oral transmission of techniques

LIVELIHOOD & CULTURAL SUSTAINABILITY

- Supports traditional artists
- Prevents extinction of rare skills

SOFT POWER & CIVILISATIONAL NARRATIVE

- Shows India as:
  - A civilisation that preserves continuity

- A culture valuing authenticity over speed

CHALLENGES IN TRADITIONAL ART CONSERVATION

- Declining number of master artists
- Lack of formal conservation schools for miniatures
- Limited funding
- Climate-related deterioration (humidity, temperature)
- Need for scientific + traditional convergence

WAY FORWARD

- Create **national conservation fellowships** for miniature arts.
- Document pigment recipes and techniques digitally.
- Integrate conservation science with traditional knowledge.
- Encourage religious institutions to adopt ethical restoration.
- Include miniature conservation in art-history curricula.
- Provide climate-controlled preservation spaces.
- Promote regional artist exchanges.

PRELIMS BOOSTER NOTES (VERY HIGH YIELD)

- Pahari painting → Himalayan miniature tradition
- Kangra school → Most refined Pahari style
- Period → 17th–19th century
- Materials → Natural pigments, handmade brushes
- Guru Gobind Singh → Founder of Khalsa (1699)
- Golden Temple → Harmandir Sahib, Amritsar
- Conservation principle → Minimum intervention
- Natural pigments age organically

The Golden Temple's restoration of a 200-year-old painting of Guru Gobind Singh using traditional Kangra Pahari techniques exemplifies how India's heritage survives not through replacement, but through the living continuity of its artistic knowledge systems.

03 PANKHUDI PORTAL: TRANSPARENT & OUTCOME-DRIVEN WCD GOVERNANCE

IN NEWS

- The **Ministry of Women and Child Development (MWCD)** has launched the **PANKHUDI Portal**, a digital platform aimed at **strengthening collaboration, transparency, and coordination** across initiatives related to **women and child development**.
- The portal seeks to improve **real-time information sharing, monitoring, and convergence** among stakeholders working in areas such as nutrition, education, protection, health, and empowerment.

UPSC RELEVANCE

- **GS2:** Governance, Social Justice, E-Governance, Welfare Schemes
- **GS1:** Women and Children issues, Human Development
- **GS4:** Ethics in governance, transparency, accountability
- **Prelims:** MWCD schemes, digital governance platforms.

BACKGROUND & CONTEXT

India's women and child development ecosystem is **multi-dimensional and multi-stakeholder**, involving:

- Central ministries

- State and district administrations
- Anganwadi centres
- Civil society organisations
- International agencies

Over the years, flagship programmes such as:

- Integrated Child Development Services (ICDS)
- Mission POSHAN 2.0
- Beti Bachao Beti Padhao
- PMMVY have delivered significant gains but also faced challenges such as:
- Fragmented data systems
- Limited inter-departmental coordination
- Delayed reporting
- Overlapping interventions
- Inadequate outcome tracking

As governance increasingly shifts towards digital-first, data-driven decision-making, the absence of a single integrated platform limited the Ministry's ability to:

- Visualise programme performance holistically
- Ensure transparency
- Foster collaboration among partners

The launch of PANKHUDI reflects a strategic move towards platform-based governance, where information flows seamlessly across administrative layers, enabling timely interventions and evidence-based policymaking.

PANKHUDI: It is an integrated, single-window digital portal launched to facilitate Corporate Social Responsibility (CSR) and partnership initiatives for women and child development.

Inspired by the vision of technology-driven governance and Jan Bhagidari, PANKHUDI acts as a bridge between the government, citizens, and institutions to promote transparency, participation, and trust.

It brings together individuals, NRIs, NGOs, CSR contributors, corporate entities, and government agencies on a common digital interface to streamline voluntary and institutional contributions.

- **Coverage:** The portal covers key thematic areas such as nutrition, health, Early Childhood Care and Education (ECCE), child welfare, protection and rehabilitation, and women's safety and empowerment.
- **Contribution:** Through the portal, contributors can register, identify initiatives, submit proposals, and track approvals and project progress, enhancing coordination, monitoring, and accountability.
- To ensure financial transparency and traceability, all contributions are accepted only through non-cash modes.
- **Significance:** PANKHUDI strengthens the implementation of flagship schemes including Mission Saksham Anganwadi & Poshan 2.0, Mission Vatsalya, and Mission Shakti through structured workflows.
    - The portal is expected to improve service delivery across 14+ lakh Anganwadi Centres, ~5,000 Child Care Institutions, ~800 One Stop Centres, 500+ Shakhi Niwas, and 400+ Shakti Sadan.
    - PANKHUDI represents a technology-enabled, outcome-oriented governance model, improving ease of doing CSR, strengthening partnerships, and enhancing ease of living for crores of beneficiaries across India.

04 RESPONSIBLE NATIONS INDEX: MEASURING SUSTAINABLE & RESPONSIBLE GOVERNANCE

IN NEWS

- The **World Intellectual Foundation (WIF)**, a **global, non-partisan and sector-agnostic think tank**, is set to launch the **Responsible Nations Index (RNI)**.
- RNI is **India's first globally anchored composite index** designed to evaluate countries on **responsible governance, sustainability, and global responsibility**, positioning India as a **norm-shaper in global governance discourse**, rather than merely a norm-taker.

UPSC RELEVANCE

- **GS2:** Governance, International Relations, Global Indices, Accountability
- **GS3:** Sustainable Development, Climate Governance
- **GS4:** Ethics in Governance, Responsibility, Global Citizenship
- **Prelims:** Global indices, governance indicators, think tanks.

BACKGROUND & CONTEXT

In recent decades, the global community has relied on indices such as:

- Ease of Doing Business
- Human Development Index (HDI)
- Corruption Perceptions Index
- Global Competitiveness Index

While these indices capture economic efficiency, human development, or institutional integrity, they often:

- Evaluate capacity, not responsibility
- Focus on outcomes, not ethical or global conduct
- Are shaped largely by Western normative frameworks

At a time of:

- Climate crisis
- Global inequality
- Geopolitical instability
- Democratic backsliding

There is growing recognition that **national power must be accompanied by national responsibility**.

The **Responsible Nations Index (RNI)** emerges from this gap. It seeks to assess **how responsibly nations govern internally and behave externally**, including their commitment to:

- Sustainability
- Inclusiveness
- Global public goods
- Multilateral cooperation

The fact that RNI is **globally anchored yet India-originated** reflects India's aspiration to play a **constructive, ethical, and responsible leadership role** in the international system—aligned with its civilisational ethos of *Vasudhaiva Kutumbakam*.

WHAT IS THE RESPONSIBLE NATIONS INDEX (RNI)?

DEFINITION

- RNI is a **composite global index** that evaluates countries on the **quality of responsibility** they demonstrate in:
    - Governance
    - Sustainability
    - International conduct

NATURE OF THE INDEX

- **Globally anchored**: Uses international data sources and benchmarks
- **Non-partisan**: No ideological or geopolitical bias
- **Sector-agnostic**: Covers governance, economy, environment, and global engagement

CORE PHILOSOPHY

Power without responsibility is unsustainable; progress without ethics is incomplete.

RNI shifts the focus from "How powerful is a nation?" to "How responsibly does a nation exercise its power?"

CORE PILLARS OF THE RESPONSIBLE NATIONS INDEX (RNI)

PILLAR 1: RESPONSIBLE GOVERNANCE

Assesses how responsibly a country governs its own people.

Indicative Parameters

- Rule of law
- Institutional accountability
- Transparency & public trust
- Inclusion of vulnerable groups
- Policy consistency & long-term orientation

Goes beyond procedural democracy to **ethical governance quality**.

PILLAR 2: SUSTAINABILITY & INTER-GENERATIONAL RESPONSIBILITY

Evaluates whether a nation's development choices protect future generations.

Indicative Parameters

- Climate action & emissions trajectory
- Resource efficiency
- Biodiversity protection
- Circular economy practices
- Alignment with SDGs

Emphasises inter-generational justice, a key GS4 concept.

PILLAR 3: GLOBAL RESPONSIBILITY & INTERNATIONAL CONDUCT

Measures how a country contributes to global public goods.

Indicative Parameters

- Commitment to multilateralism
- Peacekeeping & humanitarian assistance
- Climate finance & development cooperation
- Responsible trade and technology use
- Compliance with international norms

Highlights ethical foreign policy, not just national interest.

WHY RNI IS SIGNIFICANT

REFRAMING GLOBAL RANKINGS

- Most global indices reward:
  - Efficiency
  - Growth
  - Competitiveness
- RNI rewards:
  - Responsibility
  - Sustainability
  - Ethical conduct

Introduces a **normative correction** to global benchmarking.

INDIA AS A NORM ENTREPRENEUR

- India is no longer just being ranked—it is **shaping how nations are ranked**.
- Reflects India's leadership in:

- G20
- Climate diplomacy
- South–South cooperation

GOVERNANCE REFORM TOOL

- Helps policymakers:
  - Identify governance gaps
  - Benchmark ethical performance
  - Improve long-term policy credibility

ETHICAL DIMENSION

- Reinforces principles like:
  - Accountability
  - Stewardship
  - Global citizenship
- Aligns with constitutional morality and Gandhian ethics.

COMPARISON WITH EXISTING GLOBAL INDICES

Aspect	Traditional Indices	Responsible Nations Index
Focus	Capacity & outcomes	Responsibility & conduct
Time horizon	Short–medium term	Long-term & inter-generational
Normative base	Economic efficiency	Ethics, sustainability, global good
Global role	Limited	Central pillar

CHALLENGES & CRITICISMS

- Measuring "responsibility" involves normative judgments.
- Data availability may vary across countries.
- Risk of politicisation if not methodologically transparent.
- Needs global acceptance to gain credibility.
- Overlap with existing indices must be clearly distinguished.

WAY FORWARD

- Ensure transparent and publicly available methodology.
- Use globally accepted data sources (UN, World Bank, OECD).
- Involve international peer review mechanisms.
- Periodically update indicators to reflect emerging challenges.
- Use RNI as a dialogue tool, not a punitive ranking.
- Encourage countries to adopt RNI insights in policy reforms.
- Align RNI indicators with SDGs and climate goals.

PRELIMS BOOSTER NOTES (HIGH-YIELD FACTS)

- RNI launched by → World Intellectual Foundation
- Nature → Global composite index
- Focus → Responsible governance & global responsibility
- India's first → Globally anchored responsibility index
- Pillars → Governance, Sustainability, Global conduct
- Normative idea → Responsibility over mere power
- Linked concepts → SDGs, ethical governance, multilateralism

The Responsible Nations Index marks a paradigm shift in global benchmarking—placing ethics, sustainability, and global responsibility at the heart of national performance, and positioning India as a thought leader in responsible global governance.

05 INDIA REJECTS CHINA'S SHAKSGAM VALLEY ACTIVITIES

India Rejects China's Infrastructure Activities in Shaksgam Valley: Sovereignty, CPEC, and Strategic Implications

IN NEWS

- **India** has **strongly rejected China's infrastructure activities in the Shaksgam Valley**, describing projects under the **China–Pakistan Economic Corridor (CPEC)** as **illegal, invalid, and unacceptable**.
- India reiterated that **Shaksgam Valley is an inseparable part of Indian territory**, which has been **illegally ceded by Pakistan to China**, and that **no third party has the right to undertake projects in the area**.

UPSC RELEVANCE

- **GS2:** International Relations, India–China relations, Sovereignty disputes
- **GS1:** Physical & Political Geography (Jammu & Kashmir, border regions)
- **GS3:** National Security, Strategic Infrastructure
- **Prelims:** Shaksgam Valley, CPEC, Aksai Chin, PoK.

BACKGROUND & CONTEXT

India's objection arises from the long-standing territorial dispute involving Jammu & Kashmir, which includes areas illegally occupied by Pakistan and China. The Shaksgam Valley, located north of the Siachen Glacier in the trans-Karakoram region, is a strategically sensitive area that Pakistan illegally transferred to China in 1963 through the Sino–Pakistan Boundary Agreement.

India has never recognised this agreement, asserting that Pakistan had no legal authority to cede territory that legally belongs to India. Since the launch of China's Belt and Road Initiative (BRI) and its flagship CPEC, China has increasingly undertaken infrastructure and connectivity projects in disputed regions, including Pakistan-occupied Kashmir (PoK) and areas adjoining the Shaksgam Valley.

From India's perspective, such projects:

- Violate India's sovereignty and territorial integrity
- Undermine international law
- Have serious security and strategic ramifications, especially in the context of India–China tensions along the Line of Actual Control (LAC).

The latest statement reflects India's consistent diplomatic position that **CPEC projects passing through disputed territory are illegitimate**, regardless of their economic rationale.

SHAKSGAM VALLEY: LOCATION, GEOGRAPHY & LEGAL STATUS

GEOGRAPHICAL LOCATION

- Also known as the **Trans-Karakoram Tract**.
- Lies **north of the Siachen Glacier**, between:
  - **Karakoram Range**
  - **Kunlun Mountains**
- Covers about **5,180 sq km**.
- Sparsely populated, high-altitude, glaciated terrain.

STRATEGIC IMPORTANCE

- Overlooks key routes connecting:
  - Xinjiang (China)
  - Gilgit-Baltistan (PoK)
- Close to:

  - Aksai Chin
  - Siachen Glacier
- Enhances China's **strategic depth** near India's northern frontiers.

LEGAL & POLITICAL STATUS

- Historically part of **Jammu & Kashmir**, which acceded to India in **1947**.
- **1963 Sino–Pakistan Boundary Agreement**:
  - Pakistan ceded Shaksgam Valley to China.
  - India rejected the agreement as **null and void**.
- India maintains:
  - Pakistan, as an **occupying power**, had **no locus standi** to transfer territory.

UPSC Note: Shaksgam Valley is distinct from Aksai Chin but linked strategically.

CHINA–PAKISTAN ECONOMIC CORRIDOR (CPEC)

WHAT IS CPEC?

- A flagship corridor under China's **Belt and Road Initiative (BRI)**.
- Connects:
  - **Kashgar (Xinjiang, China)**
  - **Gwadar Port (Pakistan)**
- Estimated investment: **$60+ billion**.

COMPONENTS OF CPEC

- Transport infrastructure (roads, railways)
- Energy projects (coal, hydropower)
- Industrial zones
- Digital connectivity

CPEC THROUGH DISPUTED TERRITORY

- Passes through Gilgit-Baltistan, part of Pakistan-occupied Kashmir.
- India has consistently objected to:
  - Any CPEC activity in PoK
  - Any extension near Shaksgam Valley

- From India's view, this violates:
  - Sovereignty
  - UN principles on disputed territories

WHY INDIA REJECTS CHINA'S ACTIVITIES IN SHAKSGAM VALLEY

SOVEREIGNTY & TERRITORIAL INTEGRITY

- India asserts **absolute sovereignty** over J&K, including PoK and Shaksgam Valley.
- Infrastructure projects by China:
  - Imply recognition of Pakistan's illegal occupation
  - Undermine India's legal position

INTERNATIONAL LAW PERSPECTIVE

- No occupying power can:
  - Transfer territory
  - Permit third-party projects
- India views Sino–Pak projects as **contrary to international norms**.

STRATEGIC & SECURITY CONCERNS

- Dual-use infrastructure can support:

  - Military logistics
  - Surveillance
- Enhances **China–Pakistan strategic nexus** against India.
- Raises concerns near:
  - Siachen
  - LAC in Ladakh

PRECEDENT SETTING

- Acceptance would normalize:
  - Infrastructure in disputed areas
  - Third-party intervention

INDIA'S CONSISTENT POSITION ON CPEC & BRI

- India **boycotted all BRI Forums**.
- Repeatedly conveyed objections through:
  - Diplomatic statements
  - Bilateral dialogues
- **Emphasised that:** *Connectivity projects must respect sovereignty and territorial integrity*.

BROADER GEOPOLITICAL IMPLICATIONS

INDIA–CHINA RELATIONS

- Adds strain to already tense relations post:
  - Doklam (2017)
  - Galwan (2020)
- Infrastructure expansion seen as **strategic encirclement**.

INDIA–PAKISTAN DIMENSION

- Reinforces India's rejection of:
  - Pakistan's claims over PoK
  - Internationalisation of Kashmir issue

GLOBAL CONTEXT

- Raises questions about:

- BRI's respect for sovereignty
- Debt, transparency, and strategic intent

CHALLENGES & LIMITATIONS FOR INDIA

- Limited on-ground leverage in disputed areas.
- China's economic influence over Pakistan.
- International community's muted response.
- Need to counter narrative diplomatically and strategically.

WAY FORWARD

- Sustain **diplomatic pressure** on China and Pakistan.
- Highlight issue in **multilateral forums**.
- Strengthen infrastructure on India's side of LAC.
- Deepen partnerships with like-minded countries.
- Use international law narratives effectively.
- Maintain consistent and principled position on sovereignty.

06 JHARKHAND NOTIFIES PESA RULES: BOOST TO TRIBAL SELF-GOVERNANCE

IN NEWS

- The state of **Jharkhand** notified the **Panchayats (Extension to Scheduled Areas) Rules** in **January 2026**, extending the implementation of **PESA** to its **Fifth Schedule areas**, nearly **25 years after the state's formation (2000)**.
- The move operationalises constitutional provisions for **tribal self-governance**, empowering **Gram Sabhas** in Scheduled Areas over natural resources, development planning, and cultural matters.

UPSC RELEVANCE

- **GS2:** Constitution, Decentralisation, Tribal Governance, Panchayati Raj
- **GS1:** Indian Society – Tribal communities
- **GS3:** Land, Forests, Natural Resources, Development vs Rights
- **Prelims:** PESA Act, Fifth Schedule, Gram Sabha powers, Tribal rights.

BACKGROUND & CONTEXT

India's tribal-dominated regions, particularly those notified as Scheduled Areas under the Fifth Schedule of the Constitution, have historically faced:

- Alienation from land and forests
- Displacement due to mining, dams, and industrial projects
- Weak representation in formal governance structures

To correct this historical injustice, the 73rd Constitutional Amendment Act, 1992 introduced Panchayati Raj Institutions (PRIs) but excluded Scheduled Areas due to their distinct socio-cultural and customary systems.

Recognising the need for a customised decentralisation framework, Parliament enacted the Panchayats (Extension to Scheduled Areas) Act, 1996 (PESA). PESA seeks to:

- Extend Panchayati Raj to Scheduled Areas
- Preserve tribal customs and traditions
- Ensure community control over resources and development decisions

However, PESA is a framework law, requiring states to notify rules to make its provisions operational. Jharkhand's delay in notifying PESA Rules meant that tribal self-governance remained largely notional rather than functional—until now.

WHAT IS PESA?

LEGAL IDENTITY

- **Panchayats (Extension to Scheduled Areas) Act, 1996**
- Enacted under **Article 243M(4)(b)** of the Constitution

APPLICABILITY

- Applies to:
    - **Scheduled Areas under Fifth Schedule**
    - States like Jharkhand, Chhattisgarh, Odisha, Madhya Pradesh, Maharashtra, Rajasthan, Gujarat, Andhra Pradesh, Telangana

CORE PHILOSOPHY

Governance in tribal areas must be rooted in community decision-making, customary practices, and local control over resources.

PESA prioritises the Gram Sabha, not the Gram Panchayat, as the foundation of governance.

CONSTITUTIONAL BASIS OF PESA

FIFTH SCHEDULE OF THE CONSTITUTION

- Deals with:
    - Administration of Scheduled Areas
    - Protection of tribal interests
- Governor has special powers to:
    - Make regulations
    - Modify or repeal laws

ARTICLE 243 (PANCHAYATS) + ARTICLE 243M

- Article 243M:
    - Exempts Scheduled Areas from automatic application of Part IX
    - Allows Parliament to extend Panchayati Raj with modifications → **PESA**

LINK WITH OTHER CONSTITUTIONAL PROVISIONS

- **Article 244** – Administration of Scheduled Areas
- **Article 46** – Promotion of SC/ST interests

- **Directive Principles** – Social and economic justice

KEY PROVISIONS OF PESA

CENTRAL ROLE OF THE GRAM SABHA

- Gram Sabha is:
  - **Competent authority**
  - Custodian of community resources
- Mandatory consultation/consent of Gram Sabha for:
  - Land acquisition
  - Rehabilitation & resettlement
  - Development projects

CONTROL OVER NATURAL RESOURCES

- Ownership of:
  - Minor forest produce (MFP)
  - Minor water bodies
- Authority to:
  - Manage community forests
  - Prevent land alienation

CUSTOMARY LAW & CULTURAL PROTECTION

- Gram Sabha safeguards:
  - Tribal customs
  - Traditional dispute resolution
  - Cultural identity

ADMINISTRATIVE POWERS

- Approval of:
  - Development plans
  - Beneficiary selection
- Control over:
  - Local markets (haats)
  - Money lending activities

POLITICAL EMPOWERMENT

- Reservation of seats for: Scheduled Tribes
- Leadership positions at all levels

KEY HISTORY OF THE PESA ACT:

- **Colonial legacy of dispossession:** British forest and land laws converted tribal communities into encroachers on their own land, destroying customary systems of governance.
- **Constitutional response:** The Fifth Schedule under Article 244 was designed to protect tribal areas, but without local self-governance it remained weak.
- **73rd Constitutional Amendment (1992):** Panchayati Raj was introduced nationwide, but Scheduled Areas were kept outside its scope due to their special status.
- **Bhuria Committee (1994–95):** It recommended that Gram Sabhas, not bureaucracies, must control natural resources and development in tribal regions.
- **Enactment of PESA (1996):** Parliament passed PESA to legally empower tribal villages through direct democracy.

KEY FEATURES OF PESA:

- **Gram Sabha as the supreme authority:** Village assemblies are recognised as the core decision-making bodies in Scheduled Areas.
- **Protection of customary law and culture:** Local traditions, religious practices and tribal social systems must be respected by governance structures.
- **Control over natural resources:** Gram Sabhas have rights over minor forest produce, village water bodies and community lands.
- **Land acquisition safeguards**: No land can be acquired without consulting Gram Sabhas, and illegal land transfers can be reversed.
- **Local governance powers:** Villages regulate markets, money-lending, liquor, and decide beneficiaries of government schemes.

SUCCESSES OF PESA:

- **Legal recognition of traditional self-rule:** PESA legally elevates the Gram Sabha above Panchayats in Scheduled Areas, giving constitutional backing to tribal

customs and governance systems that existed long before modern administration.

  - **E.g.** Rarang village used this authority to enforce community-controlled Chilgoza harvesting, preventing contractor exploitation while protecting ecological sustainability.

- **Economic sovereignty via Minor Forest Produce:** By shifting ownership of NTFPs from Forest Departments to Gram Sabhas, PESA converted forest gatherers into economic stakeholders rather than wage collectors.
  - **E.g.** Gadchiroli's federated Gram Sabhas leveraged collective bargaining for tendu and bamboo, increasing incomes by cutting out middlemen and state monopolies.
- **Deepened participatory democracy:** PESA expands democracy beyond elections by making household-level and women's participation mandatory, embedding social inclusion inside governance itself.
  - E.g. Khamdhogi's rule of one man–one woman per household ensured that development decisions reflected women's needs, not just male elites.
- **Legal shield against land alienation:** The requirement of prior informed consent transforms Gram Sabhas into constitutional gatekeepers against forced displacement and bureaucratic land grabs.
  - **E.g.** Bhil villages in Udaipur blocked forest reclassification by asserting their collective rights over ancestral land through PESA-backed resolutions.
- **Community control over natural resources:** PESA allows Gram Sabhas to turn local resources into community assets, shifting villages from dependency to revenue-based self-reliance.
  - **E.g.** Vadagudem's sand cooperative channels profits into schools and healthcare, demonstrating how decentralised resource control enables local development.

CHALLENGES TO PESA:

- **Dilution of Powers by States:** Several state governments have framed restrictive rules that bypass the Gram Sabha, often reducing its role to a mere advisory body rather than a decision-maker.
- **Bureaucratic Dominance:** The traditional **top-down** administrative structure often ignores village resolutions, with officials and higher Panchayat tiers continuing to control funds and project approvals.

- **Circumvention for Industrial Projects:** Large-scale mining and infrastructure projects often use legal loopholes or coercive tactics to bypass the requirement for mandatory Gram Sabha consultation.
- **Inactivity of Constitutional Protections:** Governors and **Tribal Advisory Councils**, despite having specific mandates to oversee Scheduled Areas, rarely exercise their discretionary powers to safeguard PESA.
- **Lack of Awareness and Literacy:** High levels of digital and legal illiteracy in remote hamlets mean many communities remain unaware of their potent rights to reject land acquisition.

WAY AHEAD:

- **Operationalizing Gram Sabhas:** Villages must be provided with independent secretariats, direct funding, and technical training to manage local budgets and social developmental planning effectively.
- **Legal Convergence:** PESA implementation must be synchronized with the **Forest Rights Act (2006)** and the **Samata Judgment** to ensure that private mining cannot occur without community consent.
- **Restoring Village Authority:** State-level PESA rules require urgent amendments to ensure that the consent of the Gram Sabha is legally binding and non-negotiable for all land-related matters.
- **Independent Grievance Redressal:** A specialized judicial or quasi-judicial body should be established in Scheduled Areas to handle PESA violations without the delays of the mainstream court system.
- **Social Audits and Monitoring:** Civil society organizations should be empowered to conduct regular social audits, ensuring that transparency is maintained in how tribal resources are utilized and managed.

07 BHASHINI SAMUDAYE: BOOSTING MULTILINGUAL AI & DIGITAL INCLUSION

IN NEWS

- **BHASHINI Samudaye** is being organised by the **Ministry of Electronics and Information Technology (MeitY)** in **New Delhi** to strengthen India's **language Artificial Intelligence (AI) ecosystem**.
- The event aims to bring together **government, startups, researchers, industry, and civil society** to accelerate the development, adoption, and governance of **Indian-language AI tools** under the **BHASHINI** platform.

UPSC RELEVANCE

- **GS2:** E-Governance, Digital Inclusion, Public Service Delivery
- **GS3:** Artificial Intelligence, Emerging Technologies, Innovation Ecosystem
- **GS4:** Ethics of AI, Inclusivity, Linguistic Justice
- **Prelims:** BHASHINI, MeitY, National Language Translation Mission (NLTM).

BACKGROUND & CONTEXT

India is home to 22 scheduled languages and hundreds of non-scheduled languages and dialects. While Digital India initiatives have expanded online services, language barriers remain a major constraint to:

- Accessing government services
- Participating in the digital economy
- Using AI-powered tools

Globally, AI systems have been dominated by English and a few major world languages, creating a digital linguistic divide. In India, this risks excluding:

- Rural populations
- Tribal communities
- Elderly and first-time digital users

To address this, the Government launched BHASHINI (National Language Translation Mission) as part of the Digital India programme, envisioning AI-based, open, and interoperable language technologies for all Indian languages.

BHASHINI Samudaye (Samudaye = community) reflects a shift from a government-only mission to a collaborative national ecosystem, recognising that scalable language AI requires:

- Open datasets
- Shared models
- Community participation
- Ethical and inclusive governance

WHAT IS BHASHINI?

BHASHINI: MEANING & NATURE

- **BHASHINI** is India's **National Language Translation Mission (NLTM)**.
- It is a **digital public platform** for:
  - AI-based translation
  - Speech-to-text
  - Text-to-speech
  - Multilingual content creation

NODAL MINISTRY

- Implemented by **MeitY**.
- Anchored within India's **Digital Public Infrastructure (DPI)** framework.

CORE OBJECTIVE

To make digital services and the internet accessible to every Indian in their own language.

BHASHINI SAMUDAYE: WHAT IS IT AND WHY IT MATTERS?

WHAT IS BHASHINI SAMUDAYE?

- A **national-level collaborative forum/event** under BHASHINI.
- Designed to:
  - Build a **community of practice**
  - Strengthen India's **language AI value chain**
  - Promote co-creation and adoption

KEY STAKEHOLDERS INVOLVED

- Government ministries & departments
- Startups and tech companies
- Academic and research institutions

- Open-source contributors
- Civil society and language communities

CORE PURPOSE

- Move from **technology creation → technology adoption → technology governance**.
- Ensure BHASHINI evolves as a **living, inclusive, and scalable ecosystem**.

KEY FEATURES:

- **Ecosystem-led AI governance:** participatory model involving researchers, states, NGOs and startups.
- **BHASHINI platform & APIs:** enables real-time translation, speech-to-text and text-to-speech in Indian languages.
- **BhashaDaan:** citizen contribution platform for building open Indian-language datasets.
- **Ethical data framework:** ensures inclusive, consent-based and standardised data creation.
- **Live use-case demonstrations:** showing application in governance, education and public services.

08 MAN-PORTABLE ANTI TANK GUIDED MISSILE

IN NEWS

- **DRDO** successfully **flight-tested** the **Third-Generation "Fire & Forget" Man Portable Anti-Tank Guided Missile (MPATGM)** with **top-attack capability** against a **moving target** at **KK Ranges, Ahilya Nagar (Maharashtra)**.
- The test validates a critical infantry capability to neutralise **modern main battle tanks (MBTs)** by striking the **relatively weaker top armour**.

UPSC RELEVANCE

- **GS3:** Defence technology, indigenisation, national security
- **GS2:** Self-reliance in strategic sectors; defence procurement ecosystem
- **Prelims:** ATGM basics, "fire & forget", IIR seeker, top-attack, tandem warhead

BACKGROUND & CONTEXT (100–150 WORDS)

Armoured warfare remains central to land combat, but infantry needs portable "tank-killer" capability to stop tanks in close terrain (urban areas, mountains, forests). Traditional ATGMs often required continuous guidance (operator keeps tracking target), increasing risk to the operator and lowering hit probability under fire.

Third-generation ATGMs solve this by using a seeker (typically Imaging Infrared— IIR) that enables lock-on and autonomous guidance ("fire & forget"). A key modern requirement is top-attack, because tank top armour is thinner than frontal armour. India's successful moving-target top-attack test signals maturity of a high-end, indigenous anti-armour technology suite.

KEY FACTS / KEY FEATURES

WHAT WAS TESTED

- **Weapon:** Third-generation **Fire & Forget MPATGM**
- **Profile: Top-attack** against a **moving target**
- **Location: KK Ranges, Ahilya Nagar, Maharashtra**
- **Test date: 11 January 2026** (as per official release)

WHAT MAKES MPATGM "3RD GENERATION"

- **Imaging Infrared (IIR) homing seeker** → autonomous terminal guidance; day/night capability (IIR seeker described as suitable for day/night combat).

- **Fire & Forget:** after lock-on and launch, the operator can **take cover / reposition**, reducing exposure.

MAN-PORTABLE ANTI-TANK GUIDED MISSILE (MPATGM):

MPATGM is a third-generation, fire-and-forget, shoulder-launched anti-tank guided missile system designed to destroy modern main battle tanks and armoured vehicles.

DEVELOPED BY:

Developed by DRDO, led by Defence Research & Development Laboratory (Hyderabad).

AIM:

To provide Indian infantry with a high-precision, lightweight and lethal weapon capable of neutralising enemy armour under day-night and all-weather conditions.

KEY FEATURES:

- **Fire & Forget system:** After launch, the missile locks onto the target and guides itself, allowing the soldier to take cover or relocate.
- **IIR homing seeker:** Uses thermal imaging to detect enemy vehicles, enabling accurate targeting in day, night and low visibility.
- **Top-attack mode:** The missile strikes from above, where tank armour is thinnest, ensuring maximum destruction.
- **Tandem HEAT warhead:** A two-stage explosive first defeats reactive armour and then penetrates the main armour.
- **200–4,000 m range:** Enables infantry to engage tanks from a safe stand-off distance.
- **Man-portable launcher:** Can be carried by soldiers and also mounted on tripods or military vehicles for flexible deployment.

KEY SUB-SYSTEMS (INDIGENOUS TECH STACK)

The MPATGM integrates indigenous technologies including:

- **IIR homing seeker**
- **All-electric control actuation system**
- **Fire Control System (FCS)**
- **Tandem warhead**

- **Propulsion system**
- **High-performance sighting system**

WARHEAD & LETHALITY

- **Tandem warhead** designed to defeat **modern MBTs** (tandem = defeats Explosive Reactive Armour (ERA) by using a precursor + main charge).

TARGET SIMULATION

- A **Thermal Target System** was developed by **Defence Laboratory, Jodhpur** to simulate a tank target.

PARTNERS / PRODUCTION PATHWAY

- **Bharat Dynamics Limited (BDL)** and **Bharat Electronics Limited (BEL)** are **Development-cum-Production Partners (DcPP)** for the weapon system.

LAUNCH PLATFORMS

- Can be launched from **Tripod** or **Military Vehicle Launcher**.

DETAILED MAINS ANALYSIS

WHY INDIA NEEDS MPATGM

- **Operational necessity:** Tanks remain decisive; infantry must have **credible anti-tank** weapons at platoon/company level.
- **Terrain advantage:** In mountains/urban areas, tanks have constrained manoeuvre; infantry ATGMs become more decisive.
- **Survivability:** Fire-and-forget reduces "operator exposure time" vs older wire-guided/semi-active systems.

WHAT "TOP-ATTACK" CHANGES

- Tanks have strongest armour in **front arc**; weakest on **roof**.
- Top-attack flight profile increases probability of mission kill against MBTs, even with advanced frontal armour packages.
- "Moving target" validation is important because battlefield armour rarely stays stationary.

TECHNOLOGY SIGNIFICANCE

- **Miniaturised IIR seeker** must identify/track target signature under clutter, heat haze, countermeasures.

- **All-electric actuation + advanced avionics** improves control accuracy and reliability.
- **Tandem warhead engineering** must ensure proper spacing/timing to defeat ERA + main armour.

STRATEGIC IMPLICATIONS

- Strengthens India's **credible conventional deterrence** and raises costs for adversary armour thrusts.
- Adds to India's **precision battlefield strike** toolkit and supports doctrinal emphasis on **networked, high-lethality** infantry units.

GOVERNMENT / INSTITUTIONAL INITIATIVES

DRDO-LED INDIGENOUS DEVELOPMENT MODEL

- MPATGM is designed by **DRDO's DRDL (Hyderabad)** with multiple DRDO labs contributing sub-systems:
  - **RCI (Hyderabad)**, **TBRL (Chandigarh)**, **HEMRL (Pune)**, **IRDE (Dehradun)** etc.

DEVELOPMENT-TO-PRODUCTION BRIDGE (DCPP MODEL)

- **BDL + BEL** as DcPP indicates a planned pathway from R&D to manufacturing, quality assurance, and scale-up.

PLATFORM FLEXIBILITY

- Tripod + vehicle launcher compatibility supports varied deployment concepts (infantry ambush, mechanised support, static defence).

CRITICISMS / CONCERNS

- **Countermeasures:** Modern tanks deploy **Active Protection Systems (APS)** and IR countermeasures; missiles must evolve with ECM/decoys environment.
- **User trials & induction timeline:** Successful flight tests are a milestone, but large-scale induction needs rigorous **user evaluation**, reliability, maintainability, and supply chain readiness.
- **Cost & training:** IIR seeker-based ATGMs are high-end; require operator training, thermal sight upkeep, and logistics support.
- **Indian conditions:** Dust, high altitude, extreme temperatures—must validate performance across theatres.

WAY FORWARD

- Complete **multi-shot user evaluation trials** across deserts, plains, mountains, and night conditions.
- Strengthen **counter-APS tactics** (salvo firing, decoy integration, trajectory optimisation).
- Ensure **domestic seeker supply chain** (detectors, cooling, optics) for true self-reliance.
- Scale production via **BDL/BEL** with robust QA and assured orders.
- Integrate MPATGM into **networked battlefield** (target designation, ISR inputs).
- Build **simulators** for infantry training to reduce cost and improve readiness.
- Maintain a balanced mix of **short-range rockets + ATGMs** for layered anti-armour defence.
- Develop **variants** (vehicle-mounted, extended range, improved seeker) as threat evolves.
- Create doctrine/SOPs for **urban & mountain anti-tank ambush**.
- Improve sustainment: spares, batteries, thermal sights, storage life audits.

CONCLUSION

MPATGM's successful moving-target top-attack trial marks a major leap in India's indigenous infantry anti-armour capability, combining an IIR "fire-and-forget" seeker, tandem warhead and modern fire control—critical for deterrence, survivability, and defence self-reliance.

09 PAX SILICA INITIATIVE: INDIA–US TIE FOR SECURE SEMICONDUCTOR SUPPLY CHAINS

IN NEWS

- The **United States** has announced that **India** will be invited next month to join the **US-led Pax Silica initiative**, aimed at stabilising and deepening **India–US strategic and trade relations**.
- **Pax Silica** seeks to **secure supply chains of silicon, semiconductors, and AI-critical technologies** amid intensifying **geopolitical competition and technology fragmentation**.

UPSC RELEVANCE

- **GS2:** International Relations, Strategic Partnerships, Tech Diplomacy
- **GS3:** Semiconductor Industry, Emerging Technologies, Supply Chain Security
- **GS4:** Ethics of technology governance, equitable access
- **Prelims:** Semiconductors, critical minerals, global tech initiatives.

BACKGROUND & CONTEXT

The global economy is undergoing a profound transformation driven by **digitalisation, artificial intelligence (AI), advanced computing, and green technologies**. At the heart of this transformation lies the **semiconductor value chain**, which underpins:

- AI and machine learning
- Defence and aerospace systems

- Telecommunications (5G/6G)
- Electric vehicles and renewable energy

However, semiconductor supply chains are:

- **Highly concentrated geographically**
- Vulnerable to **geopolitical shocks**
- Dominated by a few nodes (design, fabrication, equipment, rare materials)

Recent events—pandemic disruptions, US–China tech rivalry, export controls, and regional conflicts—have highlighted the **strategic vulnerability of over-dependence on single-country supply chains**.

In this context, the US has been promoting **"friend-shoring" and "trusted partner" frameworks** to diversify and secure critical technology ecosystems. **Pax Silica** emerges as a **geo-economic initiative** to ensure that **silicon, chips, and AI enablers remain resilient, secure, and aligned with democratic values**.

India's invitation reflects its growing role as a **trusted technology partner**, manufacturing hub, and strategic actor in the Indo-Pacific.

WHAT IS PAX SILICA?

MEANING OF PAX SILICA

- "**Pax**" → peace/stability through rules and cooperation
- "**Silica**" → silicon, the foundational material for semiconductors

- Pax Silica symbolises stability in the digital age, analogous to:
    - Pax Britannica (19th century trade order)
    - Pax Americana (post-WWII global order)

NATURE OF THE INITIATIVE

- A **US-led strategic framework** (not a formal treaty yet)
- Focused on:
    - Semiconductor supply chains
    - AI-critical technologies
    - Trusted technology ecosystems

CORE OBJECTIVE

To ensure secure, resilient, and geopolitically trusted supply chains for silicon, semiconductors, and AI technologies.

CORE PILLARS OF THE PAX SILICA INITIATIVE

PILLAR 1: SECURE SEMICONDUCTOR SUPPLY CHAINS

- Diversification of:
    - Chip fabrication
    - Assembly, testing, and packaging (ATMP)
- Reducing over-concentration in a single region
- Enhancing supply chain transparency and traceability

PILLAR 2: SILICON & CRITICAL MATERIALS SECURITY

- Ensuring access to:
    - High-purity silicon
    - Rare earths and critical minerals
- Coordinated sourcing from trusted partners

PILLAR 3: AI-CRITICAL TECHNOLOGIES

- Chips for:
    - AI accelerators
    - High-performance computing
- Secure hardware foundations for:

- Defence
- Critical infrastructure
- Data centres

PILLAR 4: TRUSTED TECHNOLOGY GOVERNANCE

- Shared standards on:
  - Export controls
  - IP protection
  - Cybersecurity
- Aligning technology ecosystems with:
  - Democratic norms
  - Rule-based order

WHY INDIA'S INCLUSION IS SIGNIFICANT (MAINS ANALYSIS)

STRATEGIC TRUST & GEOPOLITICAL ALIGNMENT (GS2)

- Invitation reflects **deepening India–US strategic trust**.
- Signals India's status as a:
  - Trusted partner
  - Responsible technology actor
- Strengthens Indo-Pacific cooperation beyond security into **tech & trade**.

BOOST TO INDIA'S SEMICONDUCTOR AMBITIONS (GS3)

India has launched:

- **India Semiconductor Mission (ISM)**
- Incentives for:
  - Chip fabrication
  - ATMP units
  - Design ecosystem

PAX SILICA CAN:

- Attract advanced investment
- Enable technology transfer
- Integrate India into global semiconductor value chains

SUPPLY CHAIN RESILIENCE FOR INDIA

- Reduces dependence on:
  - Single-country suppliers
  - Unpredictable geopolitical actors
- Enhances **strategic autonomy**, not strategic alignment alone.

ECONOMIC & TRADE IMPLICATIONS

- Facilitates:
  - High-tech manufacturing
  - Skilled employment
  - Export competitiveness
- Strengthens India–US trade ties in **future-facing sectors**.

AI & DIGITAL SOVEREIGNTY

- Secure access to AI chips is essential for:
  - National security
  - Digital public infrastructure
  - Economic competitiveness

INDIA–US TECH & SEMICONDUCTOR COOPERATION: BROADER CONTEXT

EXISTING FRAMEWORKS

- **Initiative on Critical and Emerging Technology (iCET)**
- Defence technology and co-production
- Trusted telecom and digital infrastructure cooperation

COMPLEMENTARITY

United States	India
Advanced chip design	Large market
Equipment & R&D	Manufacturing scale
Capital & IP	Skilled workforce

Pax Silica builds on this **structural complementarity**.

GLOBAL IMPLICATIONS OF PAX SILICA

RE-SHAPING GLOBALISATION

- Shift from:
    - Efficiency-only globalisation
    - To **security-aware globalisation**

IMPACT ON CHINA-CENTRIC SUPPLY CHAINS

- Encourages diversification away from:
    - China-dominated manufacturing nodes
- May intensify techno-geopolitical competition.

NORM-SETTING IN TECHNOLOGY

- Establishes rules for:
    - Ethical AI
    - Secure hardware
    - Responsible innovation

CHALLENGES & CONCERNS

- Risk of technology bloc formation.
- Balancing strategic alignment with India's autonomy.
- High capital and infrastructure requirements.
- Need for skilled workforce scaling.
- Managing export controls without stifling innovation.

WAY FORWARD

- Align Pax Silica participation with **India Semiconductor Mission** goals.
- Negotiate equitable technology-sharing arrangements.
- Invest in semiconductor-skilled human capital.
- Ensure India retains policy autonomy.
- Promote sustainability in chip manufacturing.
- Integrate startups into global value chains.
- Develop robust cybersecurity and IP regimes.

10 GREENWALD LIMIT: BREAKTHROUGH IN NUCLEAR FUSION RESEARCH

IN NEWS

China's EAST fusion reactor (Experimental Advanced Superconducting Tokamak) **has achieved** stable plasma densities up to 65% beyond the Greenwald limit**, a long-recognised constraint in** magnetic confinement fusion research**.**

This milestone marks a **major advance in sustaining high-density plasma**, bringing controlled nuclear fusion closer to practical, continuous energy generation.

UPSC RELEVANCE

- **GS3:** Science & Technology, Nuclear Energy, Advanced Research
- **Prelims:** Fusion vs fission, Tokamak, Plasma physics, Greenwald limit
- **GS2 (indirect):** Global scientific cooperation, strategic technologies

BACKGROUND & CONTEXT

Nuclear fusion—the process that powers the Sun—has long been pursued as the ultimate clean energy source, offering:

- Virtually limitless fuel
- No greenhouse gas emissions
- Minimal long-lived radioactive waste

Most fusion experiments use the tokamak design, where extremely hot plasma (over 100 million °C) is confined using powerful magnetic fields. However, maintaining stable plasma at:

- High temperature
- High density
- For long durations has been one of fusion science's biggest challenges.

Among the most persistent barriers is the Greenwald limit, discovered in the late 1980s, which defines a maximum plasma density beyond which confinement becomes unstable. Exceeding this limit typically causes:

- Plasma disruptions
- Energy loss
- Collapse of confinement

China's ability to operate well beyond this limit without instability is therefore a breakthrough with global implications for fusion energy.

WHAT IS THE GREENWALD LIMIT?

DEFINITION

- The **Greenwald limit** is an **empirical density limit** in tokamak fusion devices.
- It specifies the **maximum average plasma density** that can be stably confined for a given plasma current.

ORIGIN

- Proposed by **Martin Greenwald (MIT)** in **1988**, based on experimental observations in tokamaks.

WHY IT IS IMPORTANT?

- Fusion reactions require very high plasma density, temperature, and confinement time.
- The Greenwald limit has long been a major bottleneck, preventing reactors from packing enough fuel to reach self-sustaining fusion (ignition).

KEY FEATURES:

- **Tokamak-specific limit:** The Greenwald limit applies to donut-shaped magnetic fusion reactors, where plasma is confined using strong magnetic fields.
- **Stability threshold:** Exceeding this limit normally causes plasma to become unstable and collapse, risking damage to the reactor.
- **Density–energy link:** Higher plasma density leads to more atomic collisions, which increases the rate of fusion and energy output.
- **Design barrier:** For decades, it was treated as a fixed ceiling, forcing engineers to limit fuel density in fusion reactors.

ACHIEVEMENT & SIGNIFICANCE:

- China's EAST reactor achieved 1.3–1.65 times the Greenwald limit while maintaining stability.
- Done by cooling the divertor and reducing tungsten impurities, allowing cleaner, denser plasma.
- Confirms Plasma–Wall Self-Organisation (PWSO) theory, proving a new "density-free" operating regime.

11 BANNERGHATTA NATIONAL PARK

The Central Empowered Committee (CEC) in January 2026 recommended restoring the original 2016 Ecologically Sensitive Zone (ESZ) around Bannerghatta National Park, undoing the reduced 2020 notification.

ABOUT BANNERGHATTA NATIONAL PARK:

WHAT IT IS?

Bannerghatta National Park is a protected wildlife reserve and biodiversity hotspot forming the southern green lung of Bengaluru, crucial for conserving forests, elephants, and other wildlife.

LOCATED IN:

It lies about 22 km south of Bengaluru across Bengaluru Urban and Ramanagara districts in Karnataka, in the Anekal hill range.

HISTORY:

- The area was declared a reserve forest in 1970 and became a national park in 1974.

- In 2002, a portion was carved out as the Bannerghatta Biological Park (zoo and safari) to promote conservation and tourism.

GEOLOGICAL AND PHYSICAL FEATURES:

- **Granite hill ranges:** Part of the Anekal Hills, formed of ancient granite sheets that shape the park's rugged terrain.
- **Moist deciduous valleys:** Lower elevations support dense forests that sustain elephants, deer, and predators.
- **Dry scrub uplands:** Higher elevations have scrub vegetation, important for grazing species.
- **Wildlife corridors:** BNP forms a vital elephant corridor linking BR Hills and Sathyamangalam forests.
  Water system: The **Suvarnamukhi stream** flows through the park, sustaining wildlife in a semi-arid landscape.

WHAT IS THE ISSUE?

- The Ecologically Sensitive Zone (ESZ) around BNP was reduced from 268.9 sq km (2016 draft) to 168.64 sq km (2020 notification), excluding key elephant corridors and forest buffers.
- This opened the door to real estate, quarrying and industrial expansion, increasing human–animal conflict and degrading wildlife habitats near a fast-expanding Bengaluru.

12 SWAMI VIVEKANANDA & NATIONAL YOUTH DAY: AWAKENING INDIA'S SPIRIT

IN NEWS

- The birth anniversary of **Swami Vivekananda** (12 January) was commemorated as **National Youth Day**, with the **President of India, Droupadi Murmu**, paying tribute to his enduring role in **awakening India's spiritual, cultural, and national consciousness**.
- The occasion renewed focus on Vivekananda's message of **youth empowerment, moral strength, and nation-building**.

UPSC RELEVANCE

- **GS1:** Modern Indian History, Indian Renaissance, Socio-religious reform movements
- **GS4:** Ethics, moral philosophy, leadership, youth values
- **Prelims:** National Youth Day, Chicago Parliament of Religions, Ramakrishna Mission

BACKGROUND & CONTEXT

Swami Vivekananda emerged during the **late 19th century**, a period marked by:

- British colonial domination
- Social stagnation and religious orthodoxy
- Loss of national self-confidence
- Intellectual challenge from Western modernity

Indian society was struggling to reconcile:

- **Spiritual heritage** with
- **Scientific rationalism and modern education**

Against this backdrop, Vivekananda played a transformative role by:

- Reinterpreting **Vedantic philosophy** in a modern, rational language
- Instilling **self-confidence and pride** in India's civilisational values
- Linking **spiritual awakening with national regeneration**

He belonged to the broader **Indian Renaissance**, alongside thinkers like Raja Rammohan Roy and Dayananda Saraswati, but stood out for **connecting spirituality with social action and youth mobilisation**.

EARLY LIFE & INTELLECTUAL FORMATION

BIRTH & EDUCATION

- Born as **Narendranath Datta** on **12 January 1863**, in **Kolkata**.
- Educated at:
  - Scottish Church College
- Studied:
  - Western philosophy
  - Logic
  - Science
- Initially influenced by:
  - Rationalism and scepticism

SPIRITUAL TRANSFORMATION

- Became a disciple of **Ramakrishna Paramahamsa**.
- Under Ramakrishna's guidance:
  - Experienced spiritual realisation
  - Accepted Advaita Vedanta as a universal philosophy
- Combined:
  - **Mysticism of the East**
  - **Reason of the West**

CONTRIBUTIONS TO INDIA'S SOCIO-RELIGIOUS MOVEMENT:

Vivekananda's teachings provided a rational, ethical framework for spirituality that resonated with the modern world.

- **Universal Vedanta:** He asserted that the core truths of Vedanta are relevant to all of humanity, transcending sectarian boundaries.
- **Unity in Diversity:** He popularized the pluralistic idea that "Truth is one, expressed in many ways," providing a bedrock for inter-faith harmony.
- **Practical Spirituality:** He reframed religion as lived ethics—focusing on compassion, discipline, and service rather than mere ritualism.
- **The Four Yogas:** He made spirituality accessible by expanding Yoga into four paths: **Karma** (Action), **Bhakti** (Devotion), **Jnana** (Knowledge), and **Raja** (Meditation).

- **Scientific Temperament:** He urged a rational reading of Indian texts, advocating for the integration of ancient Indian wisdom with modern scientific thought.

1893 CHICAGO PARLIAMENT OF RELIGIONS:

Vivekananda's speech at the World's Parliament of Religions in Chicago is a landmark event in global history.

- **Global Recognition:** He placed Indian spiritual thought on the global stage, projecting Vedanta as a universal philosophy.
- **Validation of Pluralism:** He championed the idea that all religions are valid paths to the same truth, strengthening mutual respect between faiths.
- **National Self-Respect:** By presenting India as a "civilizational contributor" rather than a colonial subordinate, he boosted the self-esteem of millions of Indians.

MAJOR LITERARY WORKS

Vivekananda's writings continue to serve as a "manual for life" for seekers and leaders alike:

- **Raja Yoga:** A systematic guide to meditation and mind control.
- **Karma Yoga:** An exploration of how selfless action leads to inner freedom.
- **Lectures from Colombo to Almora:** A collection of his powerful nation-building speeches.
- **Interpreting the Gita:** Presenting ancient texts as living guidance for modern challenges.

MODERN RELEVANCE AND NATIONAL YOUTH DAY:

Today, Swami Vivekananda's legacy is celebrated every year on **January 12th as National Youth Day**. His message remains a blueprint for a progressive society:

- **Youth Empowerment:** His focus on self-belief and "muscles of iron and nerves of steel" supports modern goals of entrepreneurship and leadership.
- **Social Responsibility:** He viewed social service—such as disaster relief and education—as a form of high-level spiritual practice.
- **Constitutional Values:** His philosophy of "Unity in Diversity" aligns perfectly with the democratic and pluralistic fabric of modern India.

13 ORBITAID'S AYULSAT: INDIA'S FIRST IN-ORBIT SATELLITE REFUELLING DEMONSTRATION

IN NEWS

- India is set to **demonstrate in-orbit satellite refuelling for the first time** with the launch of **AyulSAT**, developed by **OrbitAid**, onboard **PSLV-C62** of **Indian Space Research Organisation (ISRO)**.
- The mission marks a **major milestone in on-orbit servicing, assembly, and manufacturing (OSAM)** capabilities and signals India's entry into **next-generation space sustainability technologies**.

UPSC RELEVANCE

- **GS3:** Space Technology, Emerging Technologies, Innovation Ecosystem
- **GS2:** Role of private sector in strategic domains, Space governance
- **Prelims:** In-orbit refuelling, PSLV, space startups, satellite life extension

BACKGROUND & CONTEXT

Modern satellites are expensive, complex, and critical for:

- Communication
- Navigation
- Earth observation
- Defence and disaster management

However, a satellite's **operational life is often limited not by hardware failure, but by fuel depletion**, especially for:

- Station-keeping
- Orbit correction
- Collision avoidance

Globally, space agencies and private players are moving towards **On-Orbit Servicing, Assembly and Manufacturing (OSAM)** to:

- Extend satellite life
- Reduce space debris
- Lower launch costs
- Enable modular and reusable space systems

Until now, **in-orbit refuelling**—the ability to transfer propellant to a satellite in space—has remained technologically challenging due to:

- Microgravity conditions
- Precision docking requirements
- Safety and contamination risks

India's AyulSAT mission represents a **proof-of-concept step** in overcoming these challenges, placing India alongside a small group of nations exploring **space logistics and sustainability**.

WHAT IS AYULSAT?

AyulSAT is a 25-kg dedicated tanker-satellite and target spacecraft designed to demonstrate fuel transfer, power transfer and data transfer in orbit using a standardized docking and refuelling interface.

Developed by: OrbitAid Aerospace, a Chennai-based Indian space startup founded by Sakthikumar Ramachandran.

Launched through: ISRO's PSLV-C62 mission.

Aim: To demonstrate in-orbit propellant transfer and docking readiness, enabling satellite life-extension, servicing, and reduction of space debris, and to lay the foundation of an on-orbit space economy.

KEY FEATURES:

- **Internal refuelling demonstration:** Transfers fuel from one tank to another within the same satellite to study fluid behaviour in microgravity.
- **SIDRP interface:** Uses OrbitAid's Standard Interface for Docking and Refuelling Port for future spacecraft-to-spacecraft refuelling.
- **Multi-utility transfer:** Capable of fuel, power and data transfer.
- **RPOD-ready:** Will act as the target satellite for a future chaser satellite that will dock and perform actual in-orbit refuelling by end-2026.
- **Commercially oriented:** India's first commercial docking and refuelling interface deployed in orbit.

SIGNIFICANCE:

- **Satellite life extension:** Allows satellites in LEO and GEO to be refuelled instead of being abandoned.

- **Space debris reduction:** Prevents dead satellites from becoming orbital junk, supporting Debris-Free Space Mission 2030.

IN-ORBIT SATELLITE REFUELLING: WHAT DOES IT MEAN?

DEFINITION

- **In-orbit refuelling** refers to the **transfer of propellant from one spacecraft to another while both are in orbit**.

WHY IT IS TECHNICALLY DIFFICULT

- No gravity to guide fluid flow
- Need for:
    - Precise alignment
    - Leak-proof coupling
    - Autonomous control systems

KEY COMPONENTS INVOLVED

- Docking interface
- Valves and connectors
- Fluid management system
- Sensors and autonomous navigation

WHY IT IS A "GAME CHANGER"

- Satellites can:
    - Be refuelled instead of replaced
    - Operate for longer durations
- Enables:
    - Reusable spacecraft
    - Modular satellite architectures

CHALLENGES & CONCERNS

- Scaling from demo to operational missions.
- Standardisation of refuelling interfaces.
- Safety risks during docking and fuel transfer.
- Regulatory and liability issues in outer space.

- High initial R&D costs.

WAY FORWARD (UPSC MAINS-READY POINTS)

- Develop national standards for satellite refuelling interfaces.
- Integrate in-orbit servicing into future ISRO missions.
- Encourage public–private partnerships in OSAM.
- Align with international space sustainability norms.
- Support startups with long-term R&D funding.
- Strengthen space traffic management frameworks.
- Explore commercial refuelling missions' post-validation.

14 OROBANCHE AEGYPTIACA: A GROWING THREAT TO INDIA'S MUSTARD PRODUCTION

IN NEWS (SHORT + CRISP)

- India's **largest oilseed crop—mustard**—is facing a **serious yield threat** due to the **rapid spread of the parasitic weed *Orobanche aegyptiaca*** in **Rajasthan and Haryana**.
- The infestation has raised concerns over **oilseed productivity, farmer incomes, and edible oil self-reliance**, especially in north-western India.

UPSC RELEVANCE

- **GS3:** Agriculture, Cropping Patterns, Food & Oilseed Security
- **GS1:** Physical Geography (Agro-climatic regions)
- **Environment:** Invasive species, biodiversity stress
- **Prelims:** Parasitic weeds, mustard crop, oilseeds of India

BACKGROUND & CONTEXT (WHY THIS ISSUE MATTERS)

India is one of the **largest producers and consumers of edible oils**, yet remains **highly import-dependent**, especially for palm, soybean, and sunflower oil. **Mustard (rapeseed–mustard)** plays a crucial role in:

- Domestic edible oil supply
- Crop diversification in rabi season
- Farmer income stability in semi-arid regions

However, mustard productivity is vulnerable to:

- Climate variability
- Pest and weed pressure
- Soil degradation

Among weeds, ***Orobanche aegyptiaca***—a **root-parasitic flowering plant**—has emerged as a **major biotic stress**, particularly in Rajasthan and Haryana, which together account for a significant share of India's mustard area.

Unlike ordinary weeds, *Orobanche* does not photosynthesise and **derives all nutrients directly from the host crop**, often remaining unnoticed underground until damage is severe. This makes it **difficult to control** and **highly destructive**, posing a challenge to sustainable oilseed production.

WHAT IS OROBANCHE AEGYPTIACA?

BOTANICAL IDENTITY

- Common name: **Broomrape**
- Nature: **Obligate root parasitic weed**
- Chlorophyll: **Absent** (non-photosynthetic)

HOST RANGE

- Attacks:
    - Mustard
    - Tomato
    - Tobacco
    - Potato
    - Other broad-leaf crops

MODE OF PARASITISM

- Seeds germinate only when they detect **chemical signals (strigolactones)** from host roots.
- The parasite forms a **haustorium**, penetrating host roots and siphoning:
    - Water
    - Nutrients
    - Photosynthates

Damage occurs **before the weed emerges above ground**, making early detection difficult.

WHY *OROBANCHE* IS PARTICULARLY DANGEROUS

UNDERGROUND DAMAGE

- Causes:
    - Stunted growth
    - Yellowing
    - Reduced flowering and seed formation
- Yield losses can range from **30% to 70%**, and in severe cases, **total crop failure**.

HIGH REPRODUCTIVE POTENTIAL

- A single plant can produce **hundreds of thousands of tiny seeds**.
- Seeds remain **viable in soil for over 10–15 years**, creating a long-term infestation cycle.

LIMITED CHEMICAL CONTROL

- Conventional herbicides:
  - Often ineffective
  - Can damage the host crop
- Mechanical removal is difficult due to underground attachment.

MUSTARD IN INDIA: WHY THE THREAT IS SERIOUS

IMPORTANCE OF MUSTARD

- Largest domestically grown oilseed crop.
- Major contributor to:
  - Edible oil availability
  - Livelihoods of small and marginal farmers

KEY PRODUCING STATES

- Rajasthan (largest producer)
- Haryana
- Uttar Pradesh
- Madhya Pradesh

The **concentration of *Orobanche* in Rajasthan and Haryana** thus threatens **national oilseed output**, not just regional agriculture.

ENVIRONMENTAL & AGRONOMIC FACTORS BEHIND THE SPREAD

MONOCROPPING

- Continuous mustard cultivation encourages:
  - Build-up of host-specific parasites

CLIMATE STRESS

- Rising temperatures and erratic rainfall may:
  - Enhance parasite germination

- Weaken host crop resistance

SOIL HEALTH DEGRADATION

- Low organic matter and micronutrient imbalance favour parasitic weed establishment.

LIMITED AWARENESS

- Farmers often misidentify early symptoms as nutrient deficiency or drought stress.

WHY THIS IS AN ENVIRONMENTAL ISSUE (BEYOND AGRICULTURE)

AGRO-BIODIVERSITY STRESS

- Parasitic weeds reduce:
  - Crop diversity
  - Farm resilience

INCREASED CHEMICAL USE

- Farmers may resort to:
  - Excess fertilisers
  - Improper herbicide use

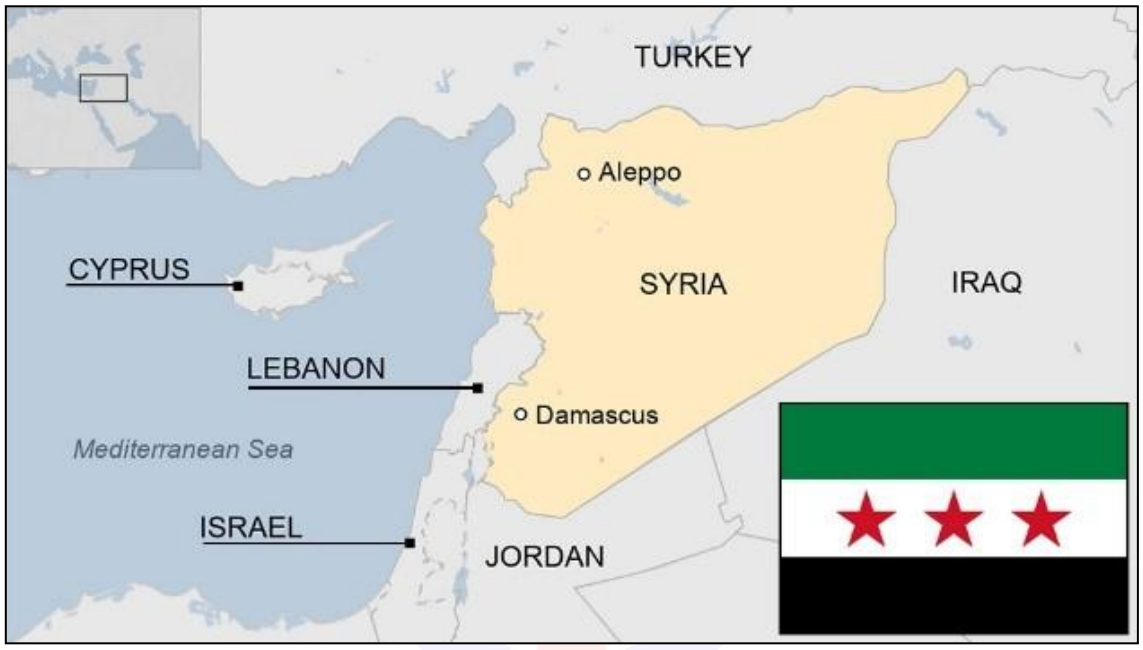
Leading to **soil and water pollution**.

FOOD SYSTEM VULNERABILITY

- Oilseed failure increases:
  - Import dependence
  - Carbon footprint of food systems

15 OPERATION HAWKEYE

The United States carried out large-scale airstrikes against ISIS targets in Syria under Operation Hawkeye after an ISIS ambush in Palmyra killed two US soldiers and a civilian interpreter.



OPERATION HAWKEYE:

Operation Hawkeye is a US-led military counter-terrorism operation involving air and precision strikes against Islamic State (ISIS) targets across Syria.

Launched by: The operation was launched by the United States under President Donald Trump and executed through US Central Command (CENTCOM) in December 2025.

Aim:

- To avenge and respond to the Palmyra ISIS ambush that killed American personnel.
- To degrade ISIS networks, prevent regrouping, and protect US and coalition forces operating in Syria.
- To reinforce the message that attacks on US personnel will invite direct military retaliation.

Syria:

Syria is a sovereign Middle Eastern country that has emerged from a 13-year civil war (2011–2024) and is currently governed by an interim government led by President Ahmed al-Sharaa.

Located in: Syria lies in south-western Asia on the eastern coast of the Mediterranean Sea, forming a strategic land bridge between West Asia, the Levant and Mesopotamia.

Capital: Damascus, one of the oldest continuously inhabited cities in the world.

Neighbouring nations: Turkey, Iraq, Jordan, Lebanon and Israel.

KEY FEATURES:

- **Mediterranean coastline** – Gives Syria sea access for trade and naval activity.
- **Al-Ansariyah Mountains** – Separate the humid coast from the dry interior.
- **Anti-Lebanon & Mount Hermon** – Form a natural border and water source.
- **Syrian Desert** – A vast arid interior with strategic importance.
- **Euphrates River** – Syria's main lifeline for irrigation and power.
- **Orontes River** – Supports fertile western valleys and settlements.

16 INDIA STRENGTHENS CRYPTO KYC RULES

IN NEWS

- **India** has introduced **stricter Know Your Customer (KYC) and Anti-Money Laundering (AML) norms** for **cryptocurrency users**, mandating:
  - **Live selfie verification**
  - **Geo-tagging**
  - **Bank account validation**
- The move aims to **curb money laundering, terror financing, and illicit financial flows** through **Virtual Digital Assets (VDAs)**, and to align India's crypto ecosystem with global AML standards.

UPSC RELEVANCE

- **GS2:** Governance, Internal Security, Terror Financing, Regulatory Institutions
- **GS3:** Financial System, Digital Economy, Emerging Technologies
- **Prelims:** KYC, AML, PMLA, Virtual Digital Assets (VDAs), crypto regulation

BACKGROUND & CONTEXT

Cryptocurrencies and other **Virtual Digital Assets (VDAs)** have witnessed rapid growth in India due to:

- Ease of cross-border transfers
- Pseudonymous transactions
- Absence of traditional intermediaries

However, these very features have also made crypto-assets attractive for:

- **Money laundering**
- **Terror financing**
- **Tax evasion**
- **Ransomware payments**
- **Illicit cross-border capital movement**

Global agencies such as the **Financial Action Task Force (FATF)** have repeatedly warned that **weak KYC norms in crypto platforms create systemic vulnerabilities**. In India, concerns intensified due to:

- Use of crypto in narcotics trade and online betting
- Routing of funds through offshore wallets
- Difficulty in identifying real beneficiaries

India has already:

- Brought VDAs under the **Prevention of Money Laundering Act (PMLA)**
- Required crypto exchanges to register with **Financial Intelligence Unit – India (FIU-IND)**

The latest tightening of KYC norms marks a **shift from basic compliance to enhanced due diligence**, reflecting India's **risk-based AML approach**.

INDIA TIGHTENS CRYPTO KYC TO CURB ILLICIT FINANCING

What it is?

It is a mandatory digital identity verification framework for users of cryptocurrency exchanges, requiring them to prove their real identity, physical presence and financial linkage before trading virtual digital assets.

Organisation involved:

- The framework is issued and enforced by the Financial Intelligence Unit (FIU-India) under the Union Ministry of Finance, in line with the Prevention of Money Laundering Act (PMLA).

Aim:

- To prevent money laundering, terror financing and proliferation financing through crypto assets.
- To ensure that crypto transactions are traceable, accountable and linked to real individuals.

KEY FEATURES:

- **Live selfie with liveness detection** – Confirms the user's physical presence and identity by detecting real-time movements, preventing deepfakes and fake photo uploads.
- **Geo-tagging with IP address** – Records the exact location and device network of onboarding to trace suspicious or cross-border activities.
- **PAN and secondary ID** – Links crypto accounts to a verified legal identity, enabling tax tracking and law-enforcement verification.
- **Penny-drop bank verification** – A Re 1 transfer ensures the bank account is active and belongs to the user, blocking mule or fake accounts.

- **OTP verification** – Confirms control over registered mobile and email, adding an extra layer of authentication.
- **Periodic KYC updates** – Keeps customer information current and risk-sensitive, especially for high-risk users.
- **Ban on mixers, tumblers and privacy tokens** – Stops tools that hide transaction trails, enabling better tracking of illicit crypto flows.

LEGAL & REGULATORY FRAMEWORK GOVERNING CRYPTO IN INDIA

PREVENTION OF MONEY LAUNDERING ACT (PMLA), 2002

- VDAs and crypto service providers classified as **"reporting entities"**.
- Obligations include:
  - Customer due diligence
  - Record maintenance
  - Reporting suspicious transactions

ROLE OF FIU–IND

- Nodal agency for:
  - AML compliance
  - Financial intelligence analysis
- Crypto exchanges must:
  - Register with FIU-IND
  - Submit periodic compliance reports

TAXATION FRAMEWORK

- 30% tax on crypto gains
- 1% TDS on transactions
- Aims to improve **traceability and formalisation**, complementing AML efforts.

17 KATHPUTLI PUPPETRY: RAJASTHAN'S LIVING FOLK TRADITION AND CULTURAL HERITAGE

IN NEWS

- **Jaipur's Kathputli Nagar**, home to nearly **250 families of traditional puppeteers**, has drawn renewed attention for preserving **Kathputli**, one of **Rajasthan's oldest living folk art traditions**.
- The settlement represents a **rare urban cluster of hereditary folk artists**, sustaining Kathputli puppetry despite challenges of urbanisation, livelihood insecurity, and cultural commodification.

UPSC RELEVANCE

- **GS1:** Indian Art & Culture – Folk Arts, Performing Traditions
- **GS2:** Cultural preservation, role of communities in heritage
- **GS4:** Ethics of cultural conservation, dignity of traditional livelihoods
- **Prelims:** Kathputli puppetry, Rajasthan folk arts, intangible heritage

BACKGROUND & CONTEXT

India's cultural heritage is not confined to monuments and classical arts; it also thrives through **living folk traditions**, passed orally and performatively across generations. **Kathputli puppetry** is one such tradition that reflects:

- Rajasthan's feudal history
- Oral storytelling traditions
- Syncretic cultural expressions

Kathputli Nagar in Jaipur emerged as a **residential cluster of itinerant puppeteer families**, traditionally belonging to the **Bhat community**, who historically performed under the patronage of:

- Rajput rulers
- Feudal landlords (*jagirdars*)

With the decline of royal patronage after Independence and rapid urbanisation, Kathputli artists faced:

- Loss of traditional performance spaces
- Irregular incomes
- Marginalisation in modern cultural markets

Yet, Kathputli Nagar continues to survive as a **living repository of folk knowledge**, highlighting both the **resilience and vulnerability** of India's intangible cultural heritage.

WHAT IS KATHPUTLI PUPPETRY?

MEANING & ORIGIN

- *Kathputli* = **Kath (wood) + Putli (doll)**
- Originated in **Rajasthan**, with roots tracing back **over 1,000 years**.
- Considered **India's oldest form of string puppetry**.

COMMUNITY ASSOCIATION

- Traditionally practised by the **Bhat community**.
- Skills transmitted **hereditarily**, from parents to children.

NATURE OF THE ART

- A **performing folk art** combining:
    - Puppetry
    - Music
    - Oral narration
    - Dance-like movements

KEY FEATURES OF KATHPUTLI PUPPETRY

PUPPETS & CRAFTSMANSHIP

- Made of:
  - Wood (mainly mango or neem)
  - Cloth, cotton, and mirror work
- Puppets usually:
  - Lack legs
  - Have long flowing skirts to conceal strings

TECHNIQUE

- Controlled by **strings tied to the head**.
- Quick jerks of strings create:
  - Dramatic movements
  - Rhythmic gestures

MUSIC & INSTRUMENTS

- Performed to live music using:
  - **Dholak**
  - **Sarangi**
- Puppeteers sing in:
  - Rajasthani dialects
  - Folk narrative style

THEMES & NARRATIVES

- Stories drawn from:
  - Rajasthani folklore
  - Epics (*Ramayana*, *Mahabharata*)
  - Tales of Rajput valour (e.g., Amar Singh Rathore)
- Often include:
  - Social satire
  - Moral lessons

KATHPUTLI NAGAR, JAIPUR: A LIVING CULTURAL SETTLEMENT

LOCATION & SIGNIFICANCE

- Situated in **Jaipur**, Rajasthan.
- Houses nearly **250 Kathputli families**.
- One of the **largest urban concentrations of folk performers in India**.

CULTURAL IMPORTANCE

- Functions as:
    - Training space for young puppeteers
    - Informal cultural school
    - Community-based archive of folk knowledge

URBAN CHALLENGES

- Threatened by:
    - Redevelopment projects
    - Loss of affordable housing
    - Displacement risks

Raises ethical questions on **development vs cultural preservation**.

WHY KATHPUTLI PUPPETRY IS IMPORTANT FOR INDIA?

INTANGIBLE CULTURAL HERITAGE

- Represents:
    - Oral history
    - Indigenous performance aesthetics
- Aligns with **UNESCO's concept of living heritage**.

SOCIAL & HISTORICAL VALUE

- Served as:
    - Medium of mass communication
    - Tool for spreading historical narratives
- Entertained and educated illiterate audiences.

CULTURAL DIVERSITY

- Reflects:
    - Linguistic diversity
    - Regional storytelling styles
- Strengthens India's plural cultural identity.

LIVELIHOOD & DIGNITY

- Source of:
    - Employment
    - Cultural dignity for marginalised communities

GOVERNMENT & INSTITUTIONAL SUPPORT

CULTURAL INSTITUTIONS

- **Sangeet Natak Akademi**
- **Indira Gandhi National Centre for the Arts**

SCHEMES

- Financial assistance to traditional artists
- Folk art festivals and cultural exchanges

TOURISM INTEGRATION

- Kathputli performances showcased at:
    - Cultural festivals
    - Tourism events

CHALLENGES & CONCERNS

- Declining interest among younger generations.
- Irregular income and lack of social security.
- Risk of cultural dilution due to commercialisation.
- Urban displacement from traditional habitats.
- Inadequate institutional documentation.

WAY FORWARD

- Recognise Kathputli as **protected intangible heritage**.

- Ensure **in-situ rehabilitation** of Kathputli Nagar artists.
- Integrate puppetry into school cultural curricula.
- Provide social security and pension support to folk artists.
- Promote digital archiving of performances.
- Encourage ethical cultural tourism.
- Support community-led cultural spaces.

TRADITIONAL PUPPETRY OF INDIA

State/Region	Major traditional puppetry forms (local names)
Tamil Nadu	· Tolu bommalatam (shadow) · Bommalatam (string-cum-rod) · Pava koothu (glove)
Kerala	· Tolpava koothu (shadow) · Pavakathakali (glove) · Nool pavakoothu (string)
Andhra Pradesh	· Tolu bommalata (shadow) · Koyya bommalata (string/wooden) · Keelu bommalata (string) · Sutram bommalata (string)
Karnataka	· Togalu gombeyata (shadow/leather) · Sutrada gombeyata / Gombeyata (string) · Yakshagana gombeyata (string—coastal) · Salaki gombeyata (rod/string mix) · Chinni patti (glove)
Maharashtra	· Chamdyacha bahulya (leather/shadow) · Kalasutri bahulya (string) · Chitrakathi / Chitren dekhavane (picture narration linked tradition)
Rajasthan	· Kathputli ka khel (string puppetry)

Uttar Pradesh	· Gulabo–Sitabo (glove puppetry)
Odisha (Orissa)	· Ravanachhaya (shadow) · Gopalila kundhei (string) · Sakhi kundhei (glove) · Kathi kundhei nacha (rod)
West Bengal	· Tarer/Sutor putul nach (string) · Danger putul nach (rod) · Benir putul (glove)
Tripura	· Putul nach (string)
Assam	· Putala nach / Putul nach (string)
Manipur	· Laithibi jagoi (string)

18 BARGI DAM

The National Dam Safety Authority (NDSA) has issued a show-cause notice to the Narmada Valley Development Authority (NVDA) over serious safety lapses at Bargi Dam.

Bargi Dam: It is a major multipurpose dam built for irrigation, drinking water supply and hydroelectric power generation.

Located in: It is located in Jabalpur district of Madhya Pradesh.

River associated: The dam is constructed on the Narmada River.

HISTORY:

- Bargi Dam was constructed as part of the Narmada Valley Development Project, which aimed to harness the Narmada River for irrigation, hydropower and water supply.
- Being the first completed dam in the series of 30 major dams on the Narmada in Madhya Pradesh, it became the foundation of the state's Narmada basin development strategy, setting the model for later projects.

KEY FEATURES:

- **21 spillway gates** – These gates regulate the **release of floodwaters and reservoir levels**, protecting downstream areas during heavy rainfall.

- **Bargi Diversion Project** – Diverts water through canals to provide irrigation to drought-prone agricultural areas, boosting crop productivity.
- **Rani Avantibai Lodhi Sagar Project** – A major storage and distribution system that supports large-scale irrigation and water supply.
- The dam creates a vast reservoir that supplies drinking water, hydroelectric power, fisheries, tourism and recreation, making it economically and socially vital for the region.

SIGNIFICANCE:

- Provides drinking water and irrigation to Jabalpur and surrounding districts.
- Supports agriculture, electricity generation and regional development.
- Acts as a tourism hub with boating, fishing and eco-tourism activities.

19 DIGITALISING DAIRY: PASHU AADHAAR & INDIA'S SECOND WHITE REVOLUTION

IN NEWS

- The **National Dairy Development Board (NDDB)** has achieved a major milestone in **digitalising India's dairy sector**, generating over **35.68 crore "Pashu Aadhaar" unique animal IDs**, according to the **Press Information Bureau**.
- This marks a decisive step towards **traceability, efficiency, productivity enhancement, and value addition** in the dairy value chain, often described as **India's Second White Revolution**.

UPSC RELEVANCE

- **GS3:** Agriculture, Dairy Sector, Animal Husbandry, Technology in Farming
- **GS2:** Governance, Digital Public Infrastructure, Farmer Welfare
- **Prelims:** NDDB, Pashu Aadhaar, livestock census, dairy cooperatives

BACKGROUND & CONTEXT

India is the **largest milk producer in the world**, contributing about **25% of global milk output**. The dairy sector:

- Supports over **8 crore rural households**, mostly **small and marginal farmers**
- Is a critical source of:
  - Supplementary income
  - Nutrition
  - Women's employment

The **First White Revolution (Operation Flood)** focused on:

- Increasing milk production
- Building cooperative institutions
- Ensuring market access

However, contemporary challenges include:

- Low animal productivity
- Disease outbreaks
- Fragmented supply chains

- Limited traceability
- Quality and safety concerns

In this context, **digitalisation** is seen as the **Second White Revolution**, shifting the focus from **quantity to quality, efficiency, transparency, and resilience**. Digital tools such as **Pashu Aadhaar**, e-governance platforms, and data-driven breeding and health management are transforming how dairy farming is practised and governed.

WHAT IS DIGITALISING INDIA'S DAIRY SECTOR?

Digitalisation of the dairy sector refers to the **use of digital technologies** to:

- Identify and track livestock
- Improve animal health and breeding
- Enhance productivity
- Ensure traceability of milk and dairy products

CORE OBJECTIVE

To make India's dairy sector data-driven, transparent, farmer-centric, and globally competitive.

KEY INSTITUTIONS INVOLVED

- **NDDB** (technical and institutional backbone)
- State dairy federations
- Cooperatives and milk unions

PASHU AADHAAR: BACKBONE OF DAIRY DIGITALISATION

WHAT IS PASHU AADHAAR?

- A **unique 12-digit identification number** assigned to each livestock animal.
- Similar in concept to Aadhaar for humans, but **for animals**.

SCALE ACHIEVED

- Over **35.68 crore animals** have been assigned Pashu Aadhaar IDs.
- Covers:
    - Cattle
    - Buffaloes
    - Other dairy livestock

INFORMATION LINKED TO PASHU AADHAAR

- Breed
- Age and sex
- Ownership details
- Vaccination and disease history
- Breeding and calving records

WHY IT IS TRANSFORMATIONAL

- Enables **animal-level traceability**.
- Forms the foundation for:
    - Disease surveillance
    - Genetic improvement
    - Insurance and credit access

TRENDS AND DATA FACTS:

- **Production:** India produced **221.06 million tonnes** of milk (2021-22), a 73% increase over the last decade.
- **Market Value:** The sector was valued at **Billion in 2021** and is projected to reach Billion by 2027.
- **Digital Reach:** Over **17.3 lakh producers** are now integrated into the Automatic Milk Collection System (AMCS).
- **Consumption:** Per capita availability has risen to **444 grams per day**, significantly higher than the global average.

IMPORTANCE OF THE DAIRY SECTOR IN INDIA:

- **Rural Livelihood Security:** It provides a regular source of income for over 80 million rural households.
    - **E.g.** In regions like Vidarbha and Marathwada, dairy acts as a safety net against crop failures, reducing the incidence of farmer distress.
- **Nutritional Security:** Milk is a primary source of animal protein for India's largely vegetarian population.
    - **E.g.** Government programs like the Mid-Day Meal increasingly include fortified milk to combat Vitamin A and D deficiencies in children.

- **Economic Contribution:** The dairy sector contributes significantly to the agricultural GDP, often surpassing the combined value of rice and wheat.
    - **E.g.** In Gujarat, the Amul model contributes billions to the state economy, demonstrating dairy as a commercial powerhouse.
- **Women Empowerment:** Dairying is primarily managed by women, providing them with financial independence.
    - **E.g.** Self-Help Groups (SHGs) in Odisha and Andhra Pradesh have successfully taken over milk collection centers, enhancing their social standing.
- **Inclusive Growth:** Livestock distribution is more equitable than land distribution, benefiting small and marginal farmers.
    - **E.g.** Roughly 75% of rural households own just 2–4 animals, yet they drive the bulk of India's 25% global market share.

INITIATIVES TAKEN FOR DIGITALIZATION:

- **National Digital Livestock Mission (NDLM):** Creating Bharat Pashudhan, a database for breeding, health, and vaccination records.
- **Pashu Aadhaar:** Issuing 12-digit unique ID ear tags to animals for full traceability.
- **Automatic Milk Collection System (AMCS):** Digitizing milk fat testing and payments to ensure farmers get fair prices instantly.
- **NDDB Dairy ERP (NDERP):** An open-source software (ERPNext) to manage supply chains from cow to consumer.
- **GIS Route Optimisation:** Using satellite mapping to reduce milk procurement distances and fuel costs for cooperatives.

OVERALL CHALLENGES IN THE DAIRY SECTOR:

- **Low Productivity per Animal:** Average milk yield in India is 987 kg per lactation, far below the global average of 2,038 kg.
    - **E.g.** Indigenous breeds often produce less than cross-bred varieties due to a lack of focused genetic upgrades in many states.
- **Fragmented Supply Chain:** About 75–85% of the marketable surplus still flows through the unorganized/informal sector.
    - **E.g.** Local milkmen (Dudhiyas) in North India often lack cold chain infrastructure, leading to higher spoilage and quality issues.

- **Feed and Fodder Scarcity:** Rising costs of concentrates and shrinking grazing lands affect profitability.
    - E.g. High inflation in maize and soybean prices recently forced many dairy unions to hike milk prices to cover input costs.
- **Quality and Adulteration:** Maintaining global sanitary standards is a hurdle for exports.
    - **E.g.** India's share in global dairy exports is <1% because many products fail to meet the strict phytosanitary norms of the EU and USA.
- **Lack of Formal Credit:** Smallholders struggle to get loans for expanding herds or upgrading technology.
    - **E.g.** Farmers often rely on local moneylenders at high interest rates because commercial banks perceive livestock as a high-risk asset.

WAY AHEAD:

- **Scaling Breed Improvement:** Focus on Artificial Insemination (AI) and genomic selection to boost the productivity of indigenous cattle.
    - **E.g.** The Semen Station Management System (SSMS) ensures that only high-quality, traceable semen doses are used nationwide.
- **Strengthening the Cold Chain:** Expanding bulk milk chillers at the village level to reduce spoilage and improve Clean Milk Production.
    - **E.g.** NDDB's AMCS integration allows cooperatives to monitor milk temperature and quality in real-time from remote villages.
- **Promoting Value-Added Products:** Shifting from liquid milk to high-margin products like cheese, probiotics, and organic milk.

- **E.g.** Brands like Epigamia and Amul are rapidly expanding into high-protein yogurts to meet urban health-conscious demand.

- **Enhancing Export Competitiveness:** Aligning Indian standards with Codex Alimentarius to tap into South Asian and Middle Eastern markets.
  - **E.g.** Creating Export Zones for dairy in states like Gujarat can help standardize quality for international certification.
- **Formalizing Credit through Technology:** Using Pashu Aadhaar data as collateral for digital lending by banks.
  - **E.g.** Fintech startups are now exploring Livestock Credit Scores based on the health and milk records stored in the NDLM database.

CONCLUSION:

By merging the traditional cooperative strength with cutting-edge digital tools like NDLM and AMCS, India is evolving into a transparent and efficient dairy superpower. This digital shift ensures that the benefits of the White Revolution reach the smallest farmer, securing India's position as a global leader in sustainable and technology-driven milk production.

20 TERI REPORT: CAPTURING VALUE IN INDIA'S SOLAR PV MANUFACTURING BOOM

IN NEWS

- **The Energy and Resources Institute (TERI)** released its report titled **"India's PV Manufacturing & Its Strategic Inflection Points"** at the **Bharat Climate Forum 2026**.
- The report was released alongside the **National Cleantech Manufacturing Implementation Plan**, highlighting how India can **move up the solar photovoltaic (PV) value chain** and capture greater economic, strategic, and technological value from its rapidly expanding solar capacity.

UPSC RELEVANCE

- **GS3:** Indian Economy, Manufacturing, Energy Security, Industrial Policy
- **GS2:** Climate commitments, Global value chains
- **Prelims:** Solar PV value chain, PLI scheme, energy transition institutions

BACKGROUND & CONTEXT

India is undergoing one of the world's fastest **energy transitions**, driven by:

- Climate change commitments
- Energy security concerns
- Rising electricity demand

India has set ambitious targets of:

- **500 GW non-fossil capacity by 2030**
- Net-zero emissions by 2070

Solar energy forms the **backbone of this transition**, with India already among the **top global solar markets in installed capacity**. However, a critical vulnerability remains: **India is still heavily dependent on imports—especially from China—for key PV components**, particularly:

- Polysilicon
- Wafers
- Cells

This creates:

- Supply chain risks
- Trade deficits

- Strategic dependence in a critical sector

TERI's report argues that India stands at a **strategic inflection point**: it can either remain a **large solar consumer** or transform into a **global PV manufacturing hub**, capturing value, jobs, and technological leadership.

TERI REPORT ON INDIA'S PV MANUFACTURING LANDSCAPE:

A strategic, policy-and-industry assessment of India's solar PV manufacturing value chain (from polysilicon → ingots/wafers → cells → modules), identifying inflection points where targeted policy, finance, R&D and skilling can make India globally competitive and resilient.

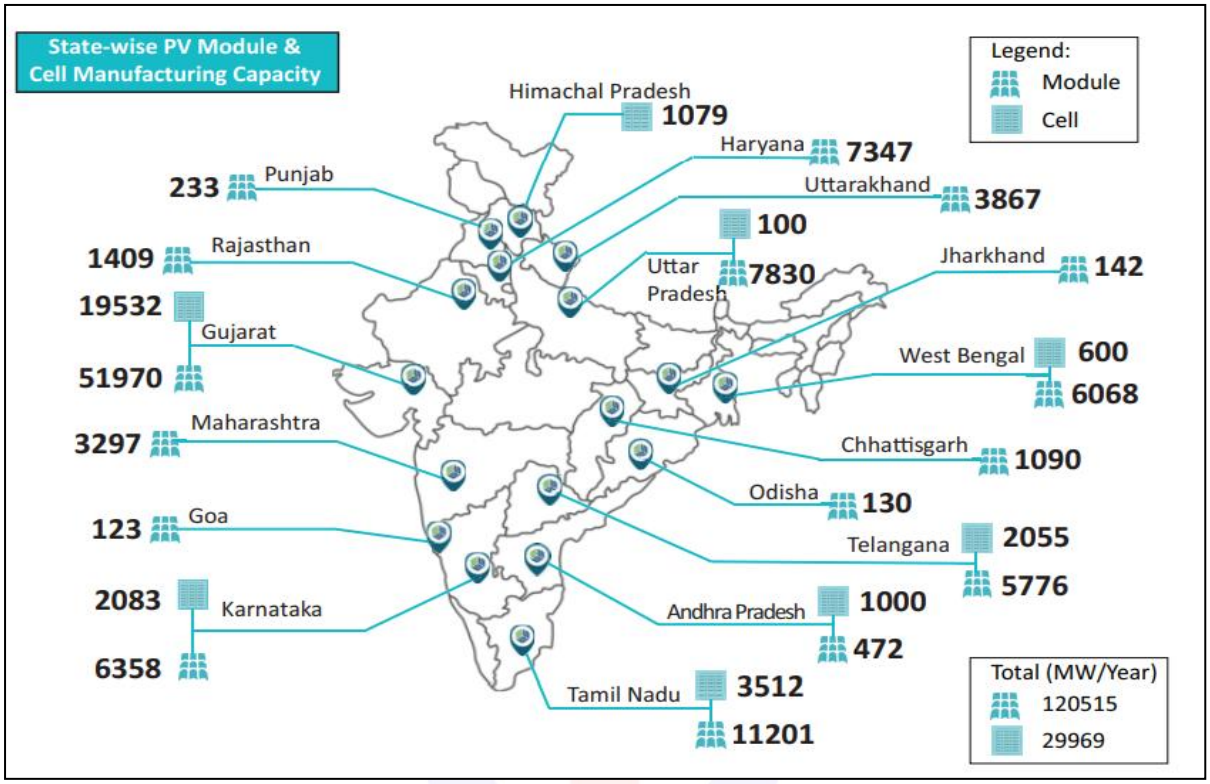
TABLE 1.1 Market share of top PV manufacturing countries[3]

Top PV Manufacturing Countries Market Share (%)				
Country	Module	Cells	Wafers	Polysilicon
China	84.6	91.8	98	92
Vietnam	3.4	1.7	2	0
India	2.7	0.5	0	0
Thailand	2.3	0.6	0	0

KEY TRENDS HIGHLIGHTED:

- **Global PV scale + China concentration:** Global cumulative PV hit ~2.2 TW (end-2024); module manufacturing capacity projected ~1.8 TW by end-2025, with ~80% concentrated in China across the full chain.
- **China's dominance is near-monopoly upstream:** China's market shares are extremely high (e.g., **~98% wafers**, **~92% polysilicon**, **~91.8% cells**, **~84.6% modules**).
- **India's current position is downstream-heavy:** India's FY2025 manufacturing is "anchored" in modules; module assembly capacity ~120 GW/year.
- **Policy has driven module scale-up:** Expansion is linked to PLI, high import tariffs on finished panels, and ALMM creating domestic demand-pull.
- **Ambition to scale fast by 2030:** India's module capacity is projected to exceed ~280 GW/year by 2030, with cell capacity rising from ~30 GW to ~171 GW/year.
- **Finance is the make-or-break enabler for upstream:** The report proposes sovereign "Green PV Bonds" to lower borrowing costs.
- **Need for ecosystem:** It recommends Solar Manufacturing Technology Parks and a PV–Semiconductor Skill Council; also highlights

structured recycling/circularity roles for governments, OEMs, developers, MSMEs and investors.



OPPORTUNITIES:

- **Upstream value capture (polysilicon→wafer→cell integration)**
  - India already has **~120 GW/yr module capacity** and plans steep scale-up by 2030; building upstream alongside this demand can retain value domestically.
- **Low-cost capital advantage via "Green PV Bonds":**
  - TERI suggests a dedicated **Green PV Bond** pool to on-lend at **4–5%**, improving bankability of capital-intensive fabs/equipment purchases.
- **Innovation clusters + pilot fabs to leapfrog technology:**
  - Proposed **Solar Manufacturing Technology Parks** with shared testing labs/clean rooms/pilot fabs can speed commercialisation (as seen in global cluster precedents cited).
- **Circularity and ESG-driven new markets:**
  - Report outlines stakeholder roadmap and calls for **PV recycling associations**, take-back programs and ESG-linked financing—opening a new Indian cleantech industry layer.

KEY CHALLENGES:

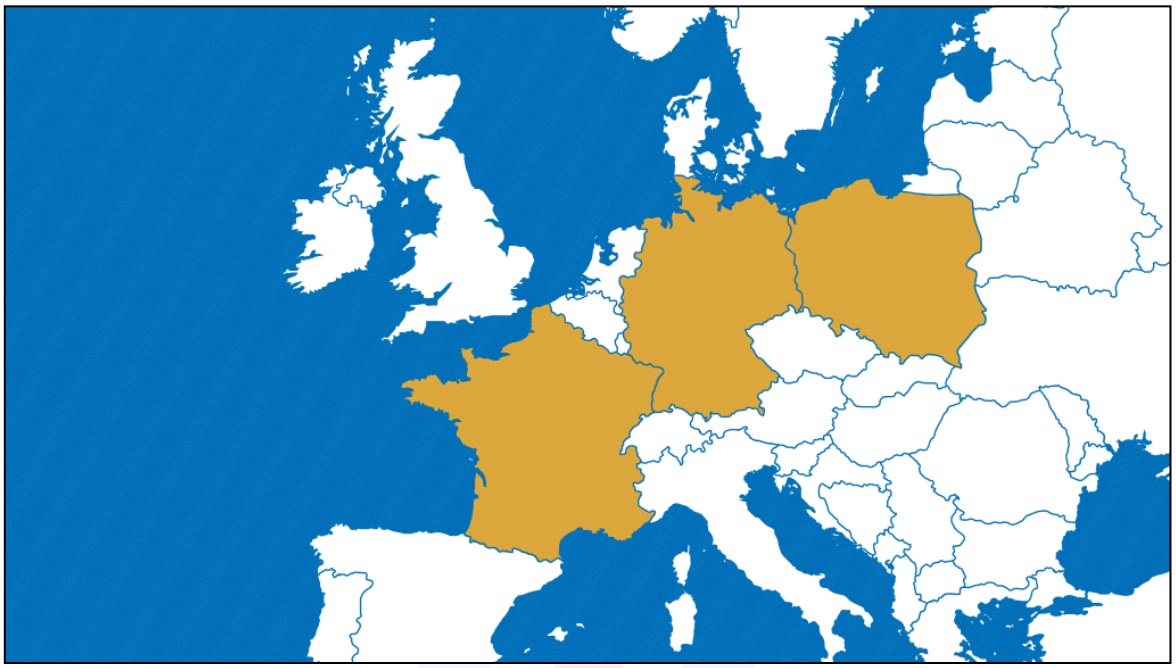
- **Over-reliance on imported upstream inputs and concentrated global supply:**
    - With China holding **~98% wafer** and **~92% polysilicon** share, any disruption can hit India's deployment/manufacturing continuity.
- **Cost of capital + risk perception for upstream fabs:**
    - TERI explicitly notes the need for risk-sharing tools and concessional structures (NIIF/DFIs/hedges) because normal financing is too expensive for mega plants.
- **Equipment/tool-chain chokepoints and FX exposure:**
    - The report recommends a **cross-currency hedge facility** (via RBI/SBI concept) because equipment imports expose fabs to rupee depreciation and project instability.
- **Sustainability compliance and end-of-life management gaps:**
    - It calls for take-back programs, industry recycling associations, and decommissioning planning—implying current recycling infrastructure is insufficient for scale.

WAY AHEAD:

- **Create upstream-ready ecosystems via Solar Manufacturing Technology Parks:**
    - Set up parks in PV-heavy states (e.g., Gujarat, Tamil Nadu) with shared labs/clean rooms/pilot fabs to cut time-to-market for new processes.
- **Deploy "Green PV Bonds" + blended finance for scale:**
    - Use Green PV Bonds and NIIF/DFI blended finance to lower borrowing costs and crowd-in private equity for polysilicon/wafer/glass/equipment.
- **Build a PV–Semicon workforce pipeline:**
    - Establish a dedicated **Skill Council** to accredit modular training via ITIs/polytechnics/corporate academies and publish a rolling 10-year roadmap aligned to capacity targets.
- **Mainstream circularity:**
    - TERI notes MNRE has identified PV recycling as a priority and proposes consortia for recovery of silicon/silver/glass plus state-level pilot take-back programs.

21 WEIMAR TRIANGLE

India participated for the first time in the Weimar Triangle format, where Poland publicly backed India over U.S. pressure on Russian oil imports.



WEIMAR TRIANGLE

The Weimar Triangle is a trilateral political and diplomatic grouping of France, Germany and Poland created to promote European integration, political dialogue and security cooperation, especially in matters concerning Russia and Eastern Europe.

Established in: 1991, Named after the city of Weimar (Germany), where the three foreign ministers first met.

Members: France, Germany and Poland.

Aim: To build a united and secure Europe by strengthening political, security and economic cooperation among Western and Central European powers, particularly in response to Russia and regional conflicts.

KEY FUNCTIONS:

- **European political coordination:** Aligns positions on major EU foreign policy, security and defence issues.
- **Security and Ukraine policy:** Plays a key role in coordinating responses to Russia and supporting Ukraine.

- **Strategic dialogue:** Enables pre-summit consultations before major EU and NATO meetings.
- **Reconciliation and integration:** Originally helped integrate Poland into NATO (1999) and the EU (2004).
- **Trilateral cooperation:** Promotes joint initiatives in diplomacy, defence, economy and culture.

SIGNIFICANCE:

- Acts as a bridge between Western Europe and Central/Eastern Europe.
- Shapes the EU's collective stance on Russia, Ukraine and security.
- Strengthens European unity during geopolitical crises.

22 FERTILIZER SECURITY: INDIA HITS RECORD DOMESTIC PRODUCTION

IN NEWS

- **India** has achieved an **all-time high fertilizer production of 524.62 lakh tonnes in 2025**, meeting nearly **73% of its total fertilizer demand through domestic supply**.
- The milestone reflects a **significant strengthening of India's fertilizer security**, reducing vulnerability to global supply shocks and supporting food security.

UPSC RELEVANCE

- **GS3:** Agriculture, Food Security, Input Subsidies, Energy–Agriculture Linkages
- **GS2:** Government policy, public sector reforms, self-reliance
- **Prelims:** Fertilizer types (Urea, DAP, NPK), fertilizer subsidies, nutrient-based subsidy

BACKGROUND & CONTEXT

Fertilizers are a **critical agricultural input**, directly influencing:

- Crop productivity
- Foodgrain output
- Farmer incomes

India's **Green Revolution** success was closely linked to assured fertilizer availability. However, over the decades, India developed:

High import dependence on key fertilizers and raw materials, especially:

- Phosphatic and potassic fertilizers
- Natural gas for urea production

Global disruptions—such as:

- COVID-19 supply chain shocks
- Geopolitical conflicts
- Energy price volatility

Exposed India's vulnerability to **external fertilizer supply risks**. In response, the government prioritised **domestic production capacity expansion**, efficiency improvements, and revival of closed fertilizer plants. The record production in 2025

signals progress towards **Atmanirbhar Bharat in agricultural inputs**, ensuring stable fertilizer availability for farmers and buffering agriculture from global turbulence.

UNDERSTANDING FERTILIZER SECURITY

WHAT IS FERTILIZER SECURITY?

Fertilizer security refers to:

- **Reliable, affordable, and timely availability** of fertilizers to farmers
- At **economically and environmentally sustainable levels**

COMPONENTS OF FERTILIZER SECURITY

- **Domestic production capacity**
- **Stable supply of raw materials** (natural gas, phosphates)
- **Efficient distribution and subsidy mechanisms**
- **Balanced nutrient use**

WHY IT IS STRATEGICALLY IMPORTANT

- Fertilizers affect:
    - Food inflation
    - Rural livelihoods
    - National food security

INDIA'S FERTILIZER LANDSCAPE: KEY FACTS

TYPES OF FERTILIZERS USED IN INDIA

- **Nitrogenous:** Urea
- **Phosphatic:** DAP, SSP
- **Potassic:** MOP
- **Complex fertilizers:** NPK

IMPORT DEPENDENCE (BEFORE RECENT PUSH)

- Urea: Partial dependence on imported natural gas
- Phosphatic & potassic fertilizers: **Highly import-dependent**

2025 MILESTONE

- Total production: **524.62 lakh tonnes**
- Domestic share of demand: **~73%**

- Reflects:
  - Capacity expansion
  - Plant revival
  - Policy support

GOVERNMENT MEASURES BEHIND THE PRODUCTION SURGE

REVIVAL OF CLOSED FERTILIZER UNITS

- Revival of urea plants at:
  - Gorakhpur
  - Sindri
  - Barauni
  - Talcher
- Reduced import burden and created regional balance.

ASSURED RAW MATERIAL SUPPLY

- Long-term LNG supply agreements
- Diversification of sourcing countries

POLICY & SUBSIDY SUPPORT

- **Urea subsidy** to ensure affordability
- **Nutrient-Based Subsidy (NBS)** for P & K fertilizers
- Timely subsidy release to manufacturers

TECHNOLOGICAL UPGRADATION

- Energy-efficient ammonia and urea plants
- Lower gas consumption per tonne of urea

WHY THIS MATTERS FOR INDIA (GS3 MAINS PERSPECTIVE)

FOOD SECURITY

- Ensures:
  - Stable crop yields
  - Predictable foodgrain output
- Supports **Public Distribution System (PDS)** stability.

ECONOMIC STABILITY

- Reduces:
    - Import bill
    - Exposure to volatile global fertilizer prices

FARMER WELFARE

- Timely fertilizer availability prevents:
    - Yield losses
    - Distress during sowing seasons

STRATEGIC AUTONOMY

- Fertilizers are **strategic commodities**, similar to:
    - Energy
    - Food grains
- Domestic capacity enhances national resilience.

ENVIRONMENTAL & STRUCTURAL CONCERNS

- Overuse of urea leading to soil nutrient imbalance.
- Fiscal burden of fertilizer subsidies.
- Environmental costs of nitrogen runoff and emissions.
- Dependence on fossil fuels for fertilizer production.

WAY FORWARD

- Promote **balanced nutrient application** (N:P: K).
- Encourage use of **nano urea and bio-fertilizers**.
- Gradually rationalize fertilizer subsidies without hurting farmers.
- Expand domestic phosphatic and potassic capacity.
- Integrate fertilizer policy with soil health management.
- Improve soil testing and advisory services.
- Explore green hydrogen-based fertilizer production.
- Strengthen fertilizer distribution monitoring.

23 KASHMIR MARKHOR: INDIA'S RAREST WILD GOAT ON THE BRINK OF LOCAL EXTINCTION

IN NEWS

- The **Kashmir markhor**, India's **rarest wild goat**, is facing the threat of **local extinction**, with only **200–300 individuals** surviving, mostly confined to the **Kazinag Range** of **Jammu and Kashmir**, according to reports highlighted by **Down To Earth**.
- Habitat fragmentation, poaching, livestock pressure, and weak conservation enforcement are key drivers of decline.

UPSC RELEVANCE

- **GS3:** Biodiversity, Wildlife Conservation, Human–Wildlife Conflict
- **GS1:** Physical Geography – Himalayan ecosystems
- **Prelims:** Markhor, IUCN status, Schedule I species, Kazinag landscape

BACKGROUND & CONTEXT

India is one of the world's **17 megadiverse countries**, hosting unique Himalayan fauna adapted to extreme terrains. The **markhor**, a wild goat species native to the **western Himalayas**, is an important indicator of **mountain ecosystem health**.

The **Kashmir markhor** represents the **only markhor population found in India**, making it ecologically and symbolically significant. Its survival is closely linked to:

- Alpine and sub-alpine habitats
- Rocky cliffs and steep slopes
- Low human disturbance zones

However, prolonged conflict in Jammu & Kashmir, infrastructure expansion, grazing pressure, and weak wildlife monitoring have eroded its habitat. With the population restricted to a **single fragmented landscape**, the species faces a **high risk of local extinction**, even though markhor populations elsewhere (e.g., Pakistan) have shown recovery under strict protection.

WHAT IS THE KASHMIR MARKHOR?

TAXONOMY & IDENTITY

- Scientific name: *Capra falconeri heptneri*
- Family: Bovidae
- Genus: *Capra*

DISTINCTIVE FEATURES

- Long, **spiral corkscrew horns** (especially in males)
- Thick coat adapted to cold climates
- Excellent climber, inhabiting steep rocky slopes

SUBSPECIES STATUS

- Kashmir markhor is a **distinct subspecies** of markhor
- Found **only in India**, unlike other markhor populations in Central and South Asia

HABITAT & DISTRIBUTION

GEOGRAPHICAL RANGE

- Confined mainly to: **Kazinag Range** (north-western J&K)
- Elevation: ~2,000 to 3,600 metres

HABITAT TYPE

- Dry temperate forests
- Scrublands
- Alpine meadows

- Rocky escarpments

PROTECTED AREAS

- Kazinag National Park (proposed/partially notified landscape)
- Adjacent forest divisions and wildlife corridors

CONSERVATION STATUS & LEGAL PROTECTION

INTERNATIONAL STATUS

- **IUCN Red List:** *Near Threatened* (species level)
- However, **Kashmir subspecies faces much higher local risk**

NATIONAL LEGAL PROTECTION

- **Wildlife (Protection) Act, 1972:** Listed under **Schedule I** (highest protection)

CITES

- Listed under **Appendix I**, restricting international trade

WHY THE KASHMIR MARKHOR IS DECLINING (MAINS ANALYSIS)

HABITAT FRAGMENTATION

- Road construction
- Border fencing
- Defence-related infrastructure
- Human settlements encroaching on traditional ranges

POACHING & ILLEGAL HUNTING

- Targeted for:
    - Meat
    - Trophies (horns)
- Weak enforcement in remote terrains

LIVESTOCK GRAZING PRESSURE

- Competition with:
    - Goats
    - Sheep

- Leads to:
    - Degraded forage
    - Disease transmission

SMALL & ISOLATED POPULATION

- Only **200–300 individuals**
- High vulnerability to:
    - Genetic bottlenecks
    - Disease outbreaks
    - Extreme weather events

CLIMATE CHANGE

- Alters:
    - Snow patterns
    - Vegetation zones
- Pushes markhor into smaller suitable habitats

WHY THE ISSUE MATTERS FOR INDIA (GS3 PERSPECTIVE)

BIODIVERSITY LOSS

- **Local extinction would mean:** Permanent loss of India's only markhor population

ECOSYSTEM BALANCE

- Markhor acts as:
    - Grazer shaping alpine vegetation
    - Prey for large carnivores

GLOBAL CONSERVATION COMMITMENTS

- Impacts India's:
    - CBD obligations
    - Wildlife conservation credibility

STRATEGIC LANDSCAPE

- Conservation in border regions supports:

- Ecological stability
- Community-based stewardship

CURRENT CONSERVATION EFFORTS

LEGAL PROTECTION

- Schedule I status prohibits hunting

LOCAL MONITORING

- Periodic population surveys by:
  - Forest Department
  - Wildlife researchers

COMMUNITY AWARENESS (LIMITED)

- Sporadic efforts to involve:
  - Local villagers
  - Shepherd communities

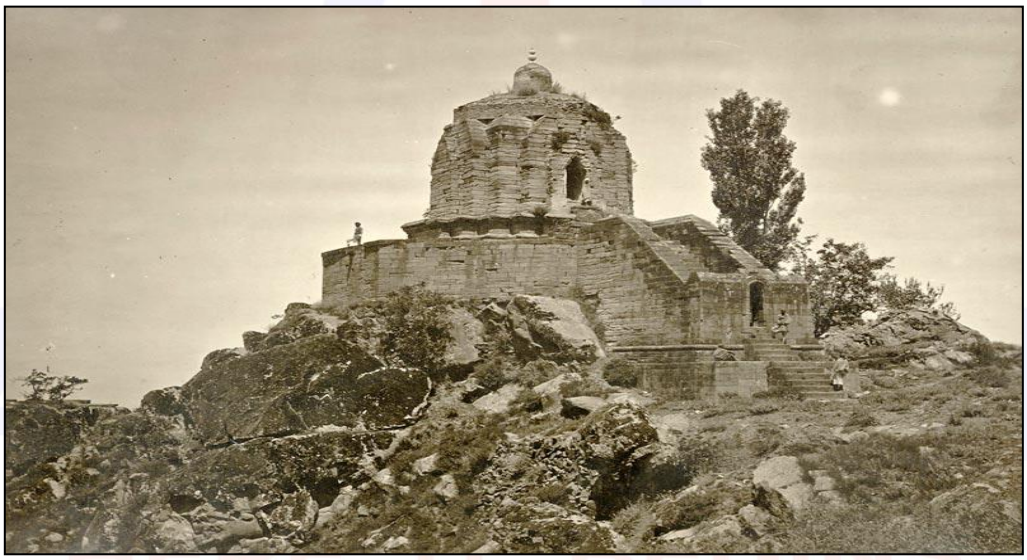
KEY CHALLENGES IN CONSERVATION

- Lack of a dedicated **species recovery plan**
- Insufficient manpower in high-altitude terrains
- Poor coordination between security and wildlife agencies
- Limited community incentives for conservation
- Inadequate scientific monitoring and genetic studies

WAY FORWARD

- Declare **Kazinag landscape as a fully protected national park**.
- Prepare a **species-specific recovery plan** for Kashmir markhor.
- Strengthen anti-poaching patrols using technology (drones, camera traps).
- Regulate and manage livestock grazing in markhor habitats.
- Promote community-based conservation with livelihood incentives.
- Conduct genetic studies to assess inbreeding risks.
- Integrate conservation with climate adaptation strategies.
- Enhance cross-border scientific cooperation where feasible.

24 ZEHANPORA STUPA: UNEARTHING KASHMIR'S 2,000-YEAR-OLD BUDDHIST LEGACY



IN NEWS

- A **major Buddhist monastic complex**, dating back nearly **2,000 years**, has been unearthed at **Zehanpora** village in **Jammu and Kashmir**, according to reports in **The Indian Express**.
- The discovery includes a **stupa and associated monastic remains**, shedding new light on **Kashmir's role as a key centre of Buddhism** along ancient trans-Himalayan routes.

UPSC RELEVANCE

- **GS1:** Indian Art & Culture – Buddhism, Stupas, Archaeology
- **GS1 (History):** Post-Mauryan to Kushana periods
- **GS3:** Conservation of heritage sites
- **Prelims:** Buddhist architecture, stupas, Kashmir Valley archaeology

BACKGROUND & CONTEXT

Kashmir has long been recognised in historical texts—such as Kalhana's Rajatarangini—as a vibrant cultural crossroads connecting Central Asia, Gandhara, and the Indian subcontinent. From the early centuries BCE to the early medieval period, the region hosted:

- Buddhist monasteries (viharas)
- Stupas and learning centres
- Scholars who contributed to Buddhist philosophy and art

Despite literary references and earlier finds, large-scale, well-preserved Buddhist monastic complexes in Kashmir are rare. The discovery at Zehanpora, therefore, is significant because it:

- Provides material evidence to corroborate textual accounts
- Helps reconstruct Buddhist networks in the western Himalayas
- Enhances understanding of religious plurality in ancient Kashmir

Dating to around the early centuries CE, the site likely corresponds to a period of intense Buddhist activity under Kushana and post-Kushana influences, when Buddhism flourished across north-western India.

WHAT IS THE ZEHANPORA STUPA?

A. NATURE OF THE SITE

A Buddhist stupa accompanied by monastic structures, suggesting a vihara–stupa complex rather than an isolated monument.

B. APPROXIMATE CHRONOLOGY

- Estimated age: ~2,000 years
- Likely period: Early Common Era (c. 1st–3rd century CE)

C. RELIGIOUS FUNCTION

The stupa would have served as:

- A reliquary monument
- A focal point for rituals, circumambulation (pradakshina), and teaching

UNDERSTANDING STUPAS IN BUDDHISM (HIGH-VALUE GS1 CONTENT)

A. WHAT IS A STUPA?

A hemispherical mound built to:

- Enshrine relics of the Buddha or revered monks
- Symbolise the Mahaparinirvana and cosmic principles

B. KEY ARCHITECTURAL ELEMENTS

- Anda: Hemispherical dome
- Harmika: Square railing atop the dome
- Yashti & Chhatra: Central pole with umbrellas
- Medhi: Circular base for circumambulation

C. SYMBOLISM

Represents:

- Buddha's presence
- Path to enlightenment
- Axis mundi (connection between earth and heavens)

KASHMIR AS A BUDDHIST CENTRE (HISTORICAL SIGNIFICANCE)

A. TEXTUAL EVIDENCE

- Rajatarangini mentions Buddhist institutions and patronage.

- Chinese travellers like Xuanzang (Hsüan-tsang) referred to Buddhist learning in Kashmir.

B. ROLE IN BUDDHIST COUNCILS

Kashmir is associated with the Fourth Buddhist Council (traditionally linked to the Kushana emperor Kanishka), which helped codify Sarvastivada Buddhism.

C. CULTURAL EXCHANGE HUB

Kashmir acted as a conduit between:

- Gandhara art traditions
- Central Asian Buddhist schools
- Indian philosophical thought

ARCHAEOLOGICAL IMPORTANCE OF THE ZEHANPORA DISCOVERY

A. EXPANDS THE BUDDHIST MAP OF INDIA

- Adds a new node to known Buddhist sites in the north-west.

B. CORROBORATES LITERARY SOURCES

- Material remains support historical accounts of Buddhist activity in Kashmir.

C. INSIGHTS INTO MONASTIC LIFE

Associated structures indicate:

- Residential quarters for monks
- Possible classrooms or meditation halls

D. CHRONOLOGICAL BRIDGE

- Helps link Gandharan Buddhism with later Kashmiri Shaivism and Hindu traditions, showing religious continuity and transition.

CONSERVATION & HERITAGE MANAGEMENT ISSUES

A. PRESERVATION CHALLENGES

Exposure to:

- Weathering
- Encroachment
- Looting

B. NEED FOR SCIENTIFIC EXCAVATION

- Stratigraphic studies
- Carbon dating
- Documentation of artefacts

C. COMMUNITY ENGAGEMENT

- Local awareness essential to prevent damage and ensure sustainable preservation.

WHY THIS MATTERS FOR INDIA (GS1 & GS3 PERSPECTIVE)

A. CULTURAL PLURALISM

- Reinforces India's image as:
- A land of religious coexistence
- A cradle of multiple philosophical traditions

B. TOURISM & SOFT POWER

Potential to:

- Develop Buddhist tourism circuits
- Strengthen ties with Buddhist-majority countries

C. ACADEMIC RESEARCH

Offers new data for:

- Archaeologists
- Historians
- Art historians

WAY FORWARD

- Declare Zehanpora site as a **protected monument** under relevant heritage laws.
- Conduct **systematic archaeological excavation and conservation**.
- Digitally document structures using **3D mapping**.
- Integrate the site into **Kashmir's Buddhist heritage circuit**.
- Involve local communities through heritage awareness programmes.
- Promote interdisciplinary research linking archaeology, history, and art.

25 GREY SLENDER LORIS (LORIS LYDEKKERIANUS)

Kerala and Tamil Nadu have initiated habitat restoration and strengthened field monitoring for the grey slender loris (Loris lydekkerianus).

GREY SLENDER LORIS (LORIS LYDEKKERIANUS)

The Grey Slender Loris is a small, nocturnal, primitive arboreal primate native to South Asia.

- **Appearance:** It has a lean body with exceptionally long, slender limbs and no visible tail.
- **Eye Adaptation:** Large, forward-facing eyes provide excellent night vision and depth perception.
- **Movement:** Unlike most primates, it cannot jump or leap; instead, it uses hand-over-hand climbing.
- **Habitat Preference:** It prefers continuous forest canopies with thin twigs and small branches.
- **Distribution:** The species is indigenous to southern India and Sri Lanka.
- **Indian Range:** In India, it is found in Tamil Nadu, Karnataka, Kerala, and Andhra Pradesh.
- **Diet:** It is primarily insectivorous, with ants and termites comprising more than half of its diet.
- **Subspecies:** In India Grey Slender Loris has two main subspecies
- **Malabar Slender Loris:** Inhabits wet, evergreen forests of the Western Ghats.
- **Mysore Slender Loris:** Occurs in dry deciduous forests of the Eastern Ghats and the Deccan Plateau.
- **Key Threats:** Habitat fragmentation, loss of Acacia nesting trees, pet trade, superstition-driven hunting, roadkill, and pesticide exposure.
- **Conservation Status: IUCN:** Near Threatened; CITES: Appendix II; WPA: Schedule I
- **Protected Area:** Tamil Nadu designated India's first species-specific sanctuary, the Kadavur Slender Loris Sanctuary, to conserve this species.

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