

WEEKLY

3 MARCH - 8 MARCH, 2025

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For UPSC, PCS and Other Exams | Pre & Mains Practice Questions



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Challenges Faced by Women Panchayat Members in India

News: A recent panel on the Ministry of Panchayati Raj highlighted how **male relatives often act as proxies for elected women** representatives in Panchayati Raj Institutions (PRIs), undermining their authority and **participation in governance**.

Women in Panchayats

The **73rd Constitutional Amendment Act, 1992**, mandated one-third reservation for women in PRIs, later expanded to 50% in several states. Today, **over 1.45 million elected women representatives (EWRs)** participate in grassroots governance. However, they continue to face systemic challenges.

Key Challenges Faced by Women Panchayat Members

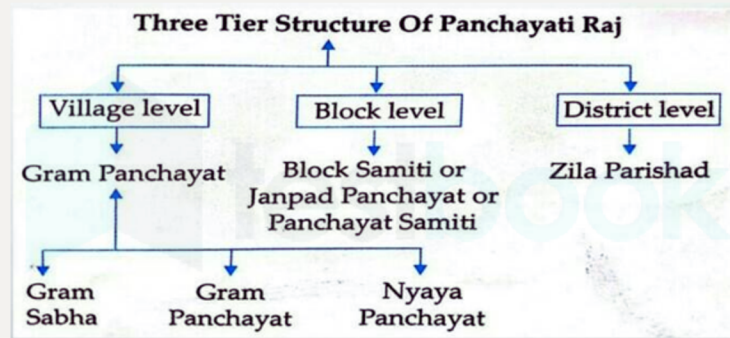
- 1. Patriarchal Mindset & Proxy Leadership:** Many women leaders remain figureheads, with male relatives—husbands (Sarpanch Pati), fathers, or brothers—making decisions on their behalf. This '**Sarpanch Pati Syndrome**' is common in states like Rajasthan, Madhya Pradesh, and Bihar.
- 2. Lack of Political Training & Awareness:** Limited knowledge of governance, financial planning, and **policy implementation** weakens women's **decision-making capabilities**, making them reliant on male counterparts or bureaucrats.
- 3. Resistance from Bureaucracy & Male Leaders:** Women leaders often **face institutional resistance**, delays in fund allocation, and a lack of recognition from bureaucrats and male politicians.
- 4. Financial Dependence:** Economic reliance on male family members limits women's political autonomy. **Restricted access to financial resources** further diminishes their independence.
- 5. Gender-Based Violence & Threats:** Women in politics, especially in rural areas, **face intimidation, verbal abuse**, and even physical violence, discouraging active participation.
- 6. Dual Burden of Work & Household Responsibilities:** Balancing political **duties with domestic chores**, childcare, and agricultural work leaves women with little time for governance.
- 7. Caste & Social Discrimination:** Women from **marginalized communities** (Dalits, Adivasis, OBCs) face intersectional discrimination, particularly in states like Uttar Pradesh, Bihar, and Haryana.

Benefits of Strengthening Women's Leadership

- **Improved Governance:** In Kerala's Kudumbashree, empowered women leaders enhanced welfare programs and poverty alleviation.
- **Gender-Responsive Policies:** Women-led panchayats in Nagaland have prioritized gender issues like maternal health and domestic violence prevention.
- **Financial Independence:** In Bihar, EWRs have successfully implemented micro-loan schemes, boosting rural employment.
- **Combating Sarpanch Pati Syndrome:** Training programs in Rajasthan have helped reduce proxy leadership cases.

Key Initiatives Supporting Women in Panchayats

- **National Rural Livelihood Mission (NRLM):** Promotes leadership skills and financial independence among rural women.
- **Mahila Sabhas:** Ensures women's issues are discussed before general panchayat meetings.
- **Panchayat Mahila Evam Yuva Shakti Abhiyan (PMEYSA):** Builds capacity and decision-making skills for EWRs.
- **Mission Shakti (2022):** Includes safety and economic empowerment initiatives to strengthen women's role in governance.
- **Women's Leadership Development Programs:** Conducted by the Ministry of Panchayati Raj in collaboration with NGOs.



Way Forward: Strengthening Women's Political Participation

- 1. Capacity-Building & Leadership Training:** Expand initiatives like the Rashtriya Gram Swaraj Abhiyan to equip women leaders with governance skills.
- 2. Strict Implementation of Anti-Proxy Laws:** Enforce legal measures to prevent male relatives from controlling women panchayat members.
- 3. Financial Empowerment:** Ensure direct access to panchayat funds and promote microfinance schemes for women's economic independence.
- 4. Reservation in Higher Political Offices:** Extend the 33-50% PRI reservation to legislative assemblies and parliament.
- 5. Strengthening Support Networks:** Expand the National Federation of Elected Women Representatives (NFEWR) across states.
- 6. Ensuring Safety & Protection:** Implement strict measures against harassment, including fast-track courts for violence against EWRs.

Conclusion: Despite significant strides in political representation, **systemic barriers continue to hinder women's leadership in PRIs**. Addressing these challenges requires a multi-pronged approach encompassing capacity-building, **legal reforms, financial empowerment**, and social support. By ensuring women's full participation in local governance, India can advance toward gender equality and inclusive development.

Progress of Direct Benefit Transfers

News: Finance Minister Nirmala Sitharaman announced that 1,100 out of 1,200 government schemes now operate under the **Direct Benefit Transfer (DBT)** system, ensuring direct payments to beneficiaries' bank accounts.

Need and Background of Direct Benefit Transfers

After gaining independence, India sought to overcome the constraints inherited from colonial rule, **focusing on centralized planning and public welfare**. However, inefficiencies such as financial leakages, delays, and corruption hindered access to welfare benefits.

Did You Know?

- Former Prime Minister Rajiv Gandhi once remarked that only **15 paise of every rupee spent on welfare reached** the intended beneficiaries, highlighting systemic inefficiencies.

Direct Benefit Transfer (DBT): Evolution and Milestones

DBT aims to provide direct financial assistance to marginalized and vulnerable populations.

Key Developments:

- The DBT mission was launched under Prime Minister Narendra Modi, **utilizing digital technologies** to enhance public service delivery.
- The launch of **Pradhan Mantri Jan Dhan Yojana (PMJDY)** laid the foundation for financial inclusion, enabling seamless benefit transfers.
- **JAM Trinity:** The integration of Jan Dhan (bank accounts), Aadhaar (biometric identification), and Mobile technology established the **world's largest targeted** payment framework.

Major Government Schemes Implementing DBT

1. **PM Kisan Samman Nidhi (PM-KISAN):** Provides financial assistance of ₹6,000 per annum to landholding farmer families, subject to exclusion criteria.
2. **Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS):** Ensures livelihood security by directly crediting wages to beneficiaries' bank or post office accounts.
3. **Pradhan Mantri Matru Vandana Yojana (PMMVY):** Encourages improved health-seeking behavior among pregnant and lactating mothers through DBT.
4. **Pradhan Mantri Awaas Yojana - Gramin (PMAY-G):** Aims to provide 2.95 crore houses to eligible rural populations, fulfilling the goal of "Housing for All."

Impact of DBT

- The number of **DBT-enabled schemes** has expanded from 28 in 2013-14 to 323 in 2024-25.
- Fund transfers have **surged nearly 1,000 times**, from ₹7,400 crores to ₹7 lakh crores.
- Savings of **₹3.5 lakh crores** have been achieved by reducing leakages and inefficiencies.
- **Aadhaar-based authentication** has eliminated over 9.2 crore ineligible beneficiaries, improving the targeting of schemes such as **PAHAL (LPG subsidy)**, MGNREGS, and Public Distribution System (PDS).
- Timely benefit transfers have enhanced the **effectiveness of scholarships, pensions**, and social assistance, reducing dependency on government offices.
- Greater **transparency and accountability** have facilitated the redesign of welfare programs like **Swachh Bharat Mission (SBM)**, PM-JAY (health insurance), and PM-KISAN.
- **Organizations like the World Bank** and IMF have praised DBT for its efficiency in reducing corruption and expanding the reach of welfare programs.

Future Potential: DBT's success can be leveraged to introduce more welfare programs and innovative policies. By **optimizing financial transfers** and enhancing governance, India can move closer to its goal of becoming a developed nation by 2047.

Estimating Poverty in INDIA

Context: A study by economists **Surjit S Bhalla** and Karan Bhasin highlights a **sharp decline** in poverty and inequality in India over the past decade.

Key Findings

- **Poverty Reduction:** The poverty rate (at the \$3.65 PPP line) fell from 52% in 2011-12 to 15.1% in 2023-24. **Extreme poverty** (at the \$1.90 PPP line) is now below 1%.
- **Consumption Growth:** The bottom three income deciles witnessed the highest increase in consumption.
- **Declining Inequality:** The **Gini coefficient dropped** from 37.5 in 2011-12 to 29.1 in 2023-24, indicating reduced income disparity.
- **Global Comparison:** India's inequality reduction is **exceptional among large economies**, with only Bhutan and the Dominican Republic performing better.
- **Need for a New Poverty Line:** Current benchmarks are outdated, **suggesting a revised approach** based on the bottom 33rd percentile or relative measures used globally.

Poverty Line Estimation in India

- **Tendulkar Committee (2009):** Defined poverty at ₹33/day (urban) and ₹27/day (rural); national poverty line for 2011-12 was ₹816 (rural) and ₹1,000 (urban) per month.
- **Rangarajan Committee (2014):** Recommended ₹47/day (urban) and ₹30/day (rural), but the government continued using the Tendulkar methodology.
- **International Standard:** The World Bank classifies individuals earning **below \$2.15/day** (adjusted for inflation and purchasing power) as extremely poor.



Challenges in India's Poverty Measurement

1. **Unrealistically Low Thresholds:** Official poverty lines (₹965 urban, ₹781 rural per month) fail to reflect basic living costs.
2. **Outdated Metrics:** Current calculations focus on calorie intake rather than evolving consumption patterns.
3. **Ignoring Non-Food Essentials:** Rising costs in health, education, and housing are inadequately considered.
4. **State-Level Disparities:** Uniform poverty lines don't account for regional cost-of-living differences.
5. **Lack of Updates:** Official poverty estimates are outdated, not reflecting inflation and economic changes.

Way Forward

- **Regular Revisions:** Update poverty lines periodically to reflect inflation and economic shifts.
- **Comprehensive Metrics:** Include healthcare, education, and housing in poverty assessments.
- **Region-Specific Estimates:** Adjust poverty lines based on state-wise cost of living.
- **Modern Methodologies:** Shift from calorie-based measures to holistic well-being indicators.

India's **poverty estimation framework** needs urgent reform to better capture economic realities and ensure targeted welfare policies.

Taxing Virtual Digital Assets

Context: India's Income Tax Bill, 2025 **introduces a legal framework for Virtual Digital Assets (VDAs)**, aligning taxation policies with global standards. Major economies like the U.K., U.S., **Singapore**, and **Australia** classify VDAs as property or securities for tax purposes.

Understanding VDAs

- **Defined in the Finance Act, 2022** under Clause 47A of the Income Tax Act, 1961.
- The Supreme Court (Internet and Mobile Association of India v. RBI) recognized VDAs as **property, commodities, or payment methods** but not legal tender.
- **VDAs include cryptocurrencies, NFTs**, and similar digital assets.

VDA Taxation in India

- Classified as **property and capital assets**, bringing them under capital gains tax provisions.
- **Profits from sales** are taxed as short-term or long-term capital gains, based on the holding period.

Key Features

- **Flat 30% tax** on VDA income, with no deductions for expenses.
- **1% TDS (Tax Deducted at Source)** on transfers, including peer-to-peer (P2P) transactions.
- **TDS exemption limits:** ₹50,000 for small traders, ₹10,000 for others.

- **Seizure of VDAs** allowed during tax investigations, similar to cash or gold.
- **Mandatory reporting** by VDA exchanges and wallet providers.
- **VDAs included** in the Annual Information Statement (AIS) for tax compliance.

Significance

- **Enhances transparency** by tracking transactions, reducing tax evasion.
- Encourages **financial discipline** among investors.
- **Boosts credibility** of India's digital asset market, attracting foreign investments.

Challenges

- **Regulatory gaps** in investor protection and market enforcement.
- **High tax burden** (30%) compared to traditional investments.

Way Forward

- A comprehensive **policy framework covering financial regulations**, consumer rights, and technology is needed.
- **Balanced taxation** to encourage compliance and industry growth.

Women and Inclusive Growth

Context: NITI Aayog's report, "From Borrowers to Builders: Women's Role in India's Financial Growth Story," highlights the growing role of women entrepreneurs in shaping India's economy.

Key Findings

- **Rising Women Borrowers:** The number of women seeking credit tripled between 2019 and 2024, with 60% from semi-urban or rural areas.
- **Demographics:** Women under 30 years account for only 27% of retail credit uptake, compared to 40% for men.
 - **Credit Growth Trends:** Women's share in business loans and gold loans increased by 14% and 6%, respectively, since 2019.
 - **Gold loans dominate** women's borrowing, accounting for 36% of loans in 2024, up from 19% in 2019.
 - **Personal loans availed by women** increased to 42% in 2024 (from 39% in 2019).
- **Financial Awareness:** 27 million women borrowers actively monitor their credit scores through CIBIL.

Significance

- **Economic Growth:** Women constitute nearly 50% of the population but contribute only 18% to GDP; empowering them could boost GDP by 27% (IMF).
- **Employment Creation:** Women-led MSMEs drive job creation and skill development.
- **Social Empowerment:** Strengthening women entrepreneurs promotes gender equality and leadership.

Government Initiatives

- **National Rural Livelihood Mission (NRLM):** Supports 9 million Self-Help Groups (SHGs) in accessing formal credit.
- **Women Entrepreneurship Platform (WEP):** Connects women entrepreneurs with public and private sector support.
- **PM SVANidhi Yojana:** Provided ₹5,939.7 crore in working capital loans to 30.6 lakh women street vendors (as of Dec 2024).
- **Pradhan Mantri Mudra Yojana (PMMY):** ₹2.22 lakh crore in loans disbursed to 4.24 crore women entrepreneurs (FY 2023-24).

Challenges for Women Entrepreneurs

- **Limited access to credit** despite growing demand.
- Societal barriers and lack of mentorship.
- Regulatory and **financial hurdles** in scaling businesses.

Way Forward: NITI Aayog emphasizes that fostering women entrepreneurs can create **150-170 million jobs** and increase female workforce participation. Enhancing credit access, **mentorship, and policy support** can unlock the full potential of women-led enterprises.

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Success of the National Health Mission (NHM)

News: The Union Health Minister recently chaired the **9th Mission Steering Group (MSG)** meeting of the NHM, reviewing its achievements and policy directions.

About NHM

Launched in 2005 as the National Rural Health Mission (NRHM) to provide **affordable healthcare** in rural areas, NHM expanded in 2013 to include the National Urban Health Mission (NUHM). The **Mission Steering Group (MSG)** is the apex policy body overseeing NHM's implementation.

Key Achievements

- **Maternal & Child Health**
 - **Maternal Mortality Ratio (MMR)** reduced by 83% (1990-2020), achieving the National Health Policy target of 100 per lakh live births.
 - **Infant Mortality Rate (IMR)** fell by 69%, and Under-5 Mortality Rate declined by 75%, both surpassing global averages.
 - **Total Fertility Rate (TFR)** declined from 3.4 (1992-93) to 2.0 (2019-21).
- **Healthcare Access & Affordability**
 - **Out-of-pocket health expenditure** dropped from 69.4% (2004-05) to 39.4% (2021-22), while government spending increased from 22.5% to 48%.
 - **Healthcare workforce** under NHM expanded from 23,000 (2006-07) to 5.23 lakh (2023-24).
- **Major Health Programs & Milestones**
 - **Disease Elimination:** WHO Certification: India eliminated Maternal & Neonatal Tetanus (2015) and Trachoma (2024).
 - **Tuberculosis:** 18% decline in TB incidence and 21% drop in mortality under the National TB Elimination Program.
 - **Malaria & Kala-azar:** 79.3% decline in malaria cases and 85.2% reduction in malaria deaths; Kala-azar elimination achieved in 2023.
 - **Health Infrastructure & Digital Expansion:** 1.76 lakh Ayushman Arogya Mandirs operational with increased patient visits and wellness sessions.
 - **Non-Communicable Disease (NCD)** screenings rose from 10.94 crore (2019-20) to 109.55 crore (2023-24).
 - **Teleconsultations surged** from 0.26 crore (2019-20) to 11.83 crore (2023-24).
 - **Special Programs:** National Dialysis Program expanded to 748 districts, treating 26.97 lakh patients.
 - **Sickle Cell Anaemia Initiative:** 5 crore screenings, 1.84 lakh diagnosed, and 2.24 crore sickle cell cards distributed.

Conclusion: NHM has **significantly improved India's maternal and child health, disease control**, and healthcare accessibility. Strengthening digital health services, financial protection, and workforce capacity will be crucial for sustaining these gains.

India's Agriculture Exports

News: India's agriculture exports **grew 6.5%, reaching \$37.5 billion** (April-Dec 2024) from \$35.2 billion in the same period of 2023. However, the **agriculture trade surplus** has declined from \$27.7 billion (2013-14) to \$16 billion (2023-24) due to multiple challenges.

Key Trends in Agri-Trade

- **Declining Export Competitiveness:** The FAO food price index (2014-16=100) dropped from 119.1 (2013-14) to 96.4 (2019-20), making Indian exports less competitive while increasing vulnerability to cheaper imports.
 - **Rising Agricultural Imports:** Pulses: Imports fell from \$4.2 billion (2016-17) to \$1.7 billion (2018-23) due to higher domestic production but **surged past \$5 billion** in 2023-24 due to a poor harvest.
 - **Edible Oils:** Expected to be the highest after 2021-22 (\$19 billion) and 2022-23 (**\$20.8 billion**) due to rising global prices.
 - **Cotton:** India became a **net importer in 2024**, with exports falling 8.1% (\$575.7 million) and imports surging 84.2% (\$918.7 million).

Reasons for Declining Agri-Trade Surplus

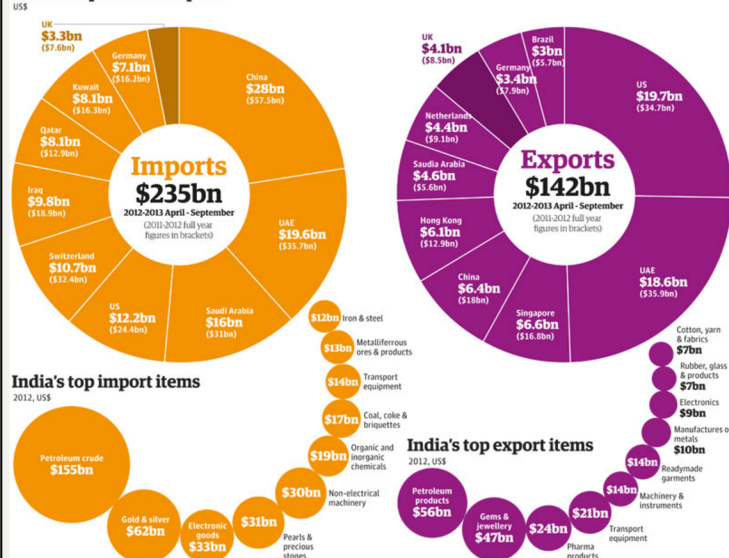
- **Frequent Export Restrictions** (e.g., bans on rice, sugar exports) have reduced India's global trade credibility.
- **Supply Chain Disruptions** due to COVID-19, Russia-Ukraine war, and rising input costs (fertilizers, fuel, logistics).
- **Climate Variability** (e.g., El Niño-induced monsoon fluctuations) impacting production, especially in rainfed crops like pulses.

Way Forward

- **Diversify Export Markets:** Expand beyond U.S. and China to boost marine and farm product exports.
- **Enhance Climate Resilience:** Strengthen irrigation and climate-resilient farming to stabilize production.
- **Improve Export Competitiveness:** Invest in agricultural R&D and value-added processing to enhance productivity and lower costs.
- **Optimize Trade Policies:** Use trade agreements for better market access.

India must **balance food security** with export growth by fostering stable policies, resilient farming, and global competitiveness.

India's imports and exports



Way Forward: NITI Aayog emphasizes that fostering women entrepreneurs can create **150-170 million jobs** and increase female workforce participation. Enhancing credit access, **mentorship, and policy support** can unlock the full potential of women-led enterprises.

Antarctic Circumpolar Current (ACC) is Slowing Down Rapidly

Context: Scientists warn that the Antarctic Circumpolar Current (ACC) could slow by **20% by 2050** under high carbon emissions, threatening global climate stability.

About ACC

- **Strongest Ocean Current:** Five times stronger than the Gulf Stream and 100 times stronger than the Amazon River.
- **Global Climate Regulator:** Moves clockwise around Antarctica, preventing warm waters from reaching the continent and absorbing heat & CO₂ from the atmosphere.
- **Part of the Global Ocean Conveyor Belt:** Connects the Pacific, Atlantic, and Indian Oceans, circulating heat, nutrients, and carbon globally.

About Antarctic Circumpolar Currents

- ACC is the **world's strongest ocean current**.
 - It's five times stronger than the Gulf Stream and more than **100 times stronger** than the Amazon River.
 - It forms part of the global ocean "**conveyor belt**" connecting the Pacific, Atlantic and Indian oceans.
- **ACC's Role:** ACC **moves clockwise around Antarctica** and regulates global climate by influencing the ocean's ability to **absorb heat and CO₂** and preventing warm waters from reaching Antarctica.
 - The system **regulates Earth's climate** and pumps water, heat and nutrients around the globe.

Impacts of Slowing down of ACC

- **Impact on Climate and Carbon Absorption:** If the ACC breaks down, it could lead to more **climate variability, extreme weather** in certain regions, and accelerated global warming due to reduced carbon absorption by the ocean.
- **Threat to Antarctic Ecosystem:** Slowing of the ACC could allow **invasive species** (e.g., southern bull kelp, shrimp, mollusks) to reach Antarctica, disrupting the local food web and affecting native species like penguins.
- **Impact of Melting Ice Sheets:** Melting ice shelves add fresh water to the ocean, altering its salinity, **weakening the Antarctic Bottom Water formation**, and reducing the strength of the ocean jet around Antarctica.

Understanding Ocean Currents & Conveyor Belt

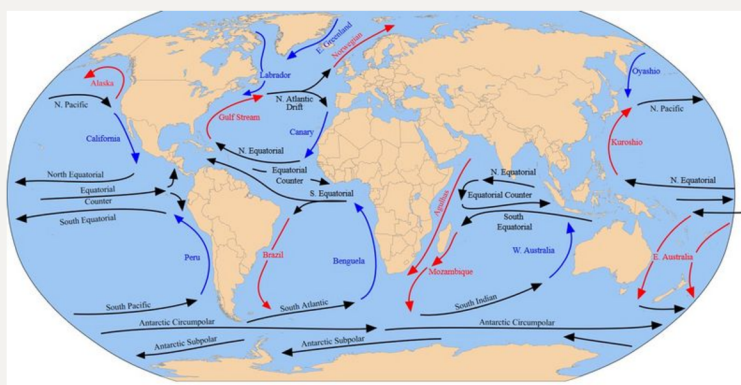
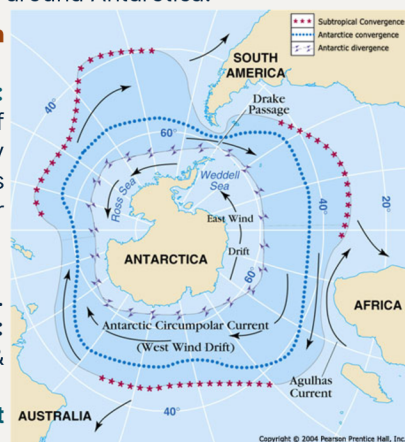
- **Ocean Currents:** Continuous movement of seawater driven by gravity, wind (Coriolis Effect), and water density.

- **Horizontal movement:** Currents.
- **Vertical movement:** Upwellings & downwellings.

Ocean Conveyor Belt (Thermohaline Circulation - THC)

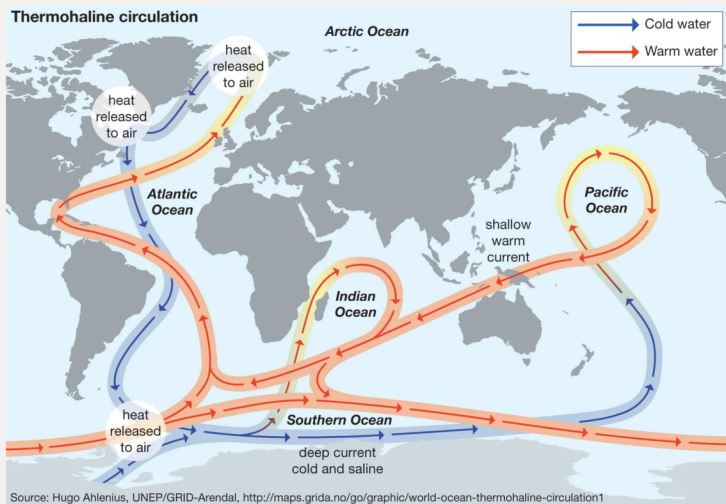
Circulation - THC): Begins in the North Atlantic, where cold water sinks and flows southward.

- Moves through the **Southern Ocean into the Indian & Pacific Oceans**, where surface water warms and returns to the equator.
- **Regulates Earth's climate**, redistributes heat, nutrients, and carbon.



Significance of Ocean Currents

- **Climate Regulation:** Stabilizes global temperatures by transferring heat between the equator and poles.
- **Supports Marine Life:** Distributes nutrients, sustaining phytoplankton and the ocean food chain.
- **Influences Weather:** Affects El Niño, La Niña, rainfall, and storms.
- **Carbon Sequestration:** Absorbs CO₂, acting as a carbon sink.
- **Fisheries & Economy:** Determines fish distribution, impacts global fisheries, and shipping routes.
- **Ocean Mixing & Coastal Impact:** Regulates salinity, oxygen levels, sea level rise, and coastal erosion.



Conclusion: The future of ACC depends on immediate climate action. **Reducing greenhouse gas emissions** can limit Antarctic ice melt and stabilize the current. **Long-term monitoring** of the Southern Ocean is essential to track these critical changes.

US\$21 Billion Liquidity Infusion : RBI

News: To address tight liquidity conditions in the **banking system**, the Reserve Bank of India (RBI) has announced a US\$21 billion liquidity infusion through:

1. **Two Open Market Operations (OMOs)**
2. **A USD/INR Buy/Sell Swap Auction**

Background

Since November 2024, **liquidity has been under pressure** due to:

- **Tax outflows**, reducing cash availability in banks.
- **Foreign Portfolio Investor (FPI)** withdrawals, leading to capital outflows.
- **RBI's forex interventions** to stabilize the rupee, which drained rupee liquidity.

This move **aims to stabilize liquidity, support lending**, and maintain economic stability.

Understanding RBI's Liquidity Tools

1. **Open Market Operations (OMO)**
 - **Buying Government Securities (G-Secs)** (G-Secs) → Increases liquidity and boosts money supply.
 - **Selling G-Secs** → Reduces money supply, tightening liquidity.
2. **US Dollar-Indian Rupee Swap Auction**
 - **Banks sell US dollars to RBI** now and agree to buy them back later at a pre-determined rate.
 - **Conducted via auction**, where banks quote swap rates (forward premium/discount).

Why is Liquidity Infusion Needed?

- **To support credit flow:** Banks face a liquidity crunch, restricting lending.
- **To stabilize interest rates:** Prevents sudden spikes in borrowing costs.
- **To boost market confidence:** Reassures investors and businesses.
- **To sustain economic growth:** Supports investment and consumption.

Potential Risks & Concerns

- **Inflationary pressures:** Excess liquidity may push inflation higher.
- **Rupee depreciation risk:** Forex swaps could weaken the rupee if not managed well.
- **Uneven liquidity distribution:** Larger banks may benefit more than smaller ones.

Other Liquidity Management Tools Used by RBI

Quantitative Tools (Direct Money Supply Impact)

1. **Liquidity Adjustment Facility (LAF):** Repo & Reverse Repo to regulate short-term liquidity.
2. **Cash Reserve Ratio (CRR):** Minimum reserves banks must hold with RBI.
3. **Statutory Liquidity Ratio (SLR):** Portion of deposits banks must hold in G-Secs.
4. **Bank Rate:** Influences long-term borrowing costs and credit expansion.

Qualitative Tools (Indirect Credit Regulation)

1. **Credit Rationing:** Restricting loans to certain sectors.
2. **Moral Suasion:** Persuading banks to follow RBI policies.
3. **Selective Credit Control (SCC):** Controlling loans for speculative activities.
4. **Margin Requirement:** Adjusting collateral requirements for loans.

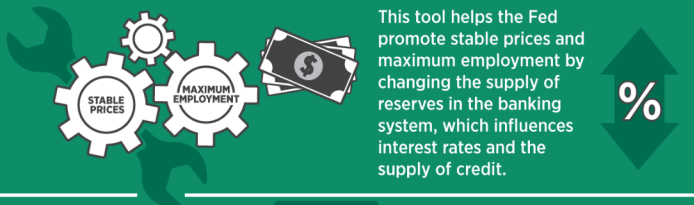
Conclusion: RBI's **liquidity infusion aims to balance economic stability** and credit growth, ensuring that businesses and consumers have **adequate access to funds** while minimizing risks like inflation and currency depreciation.

Open market operations:

Central bank purchases and sales of securities in the open market as a way to implement monetary policy.



What is this monetary policy tool used for?



EXAMPLES

Expansionary monetary policy: Like tapping the accelerator

- The FOMC wants interest rates to decrease:
- The Trading Desk is directed to engage in open market operations, including purchases of government securities.
 - This injects reserves into the banking system.
 - This puts downward pressure on the federal funds rate and, thus, other interest rates, encouraging borrowing.



Contractionary monetary policy: Like tapping the brakes

- The FOMC wants interest rates to increase:
- The Trading Desk is directed to engage in open market operations, including the sale of government securities.
 - Banks have fewer reserves available to lend.
 - This puts upward pressure on the federal funds rate and other interest rates, encouraging saving.



Kessler syndrome: Space Debris

News: A 500-kg metal object, likely **space debris**, crashed in **Kenya**, raising concerns about **space governance**, accountability, and regulatory gaps.

What is Space Debris?

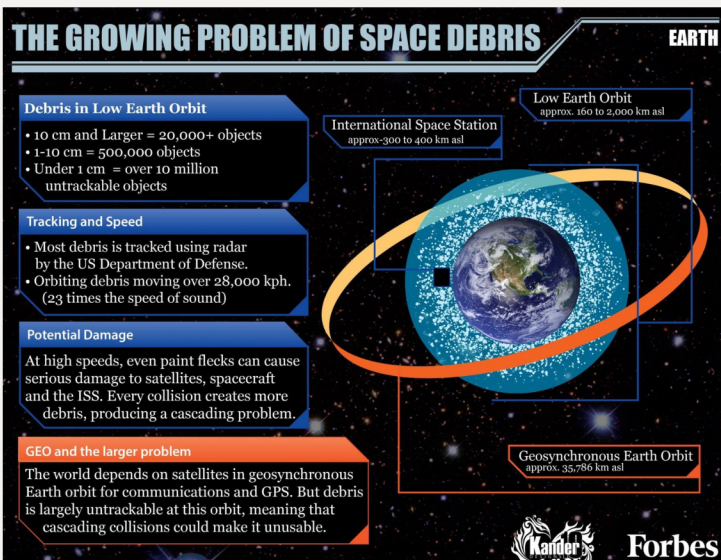
- **Non-functional objects** in Earth's orbit, including defunct satellites, rocket stages, and mission fragments.
- **Defined by UN-COPUOS** as all man-made, non-functional objects in orbit or re-entering Earth's atmosphere.
- NASA estimates millions of debris pieces orbit Earth, posing risks to space operations.

Major Space Debris Incidents

- 2022: **Chinese Long March 5B** rocket fell into the Indian Ocean.
- 2023: **SpaceX Falcon 9 debris** landed on an Australian farm.
- 2024: **Russian satellite** fragments disintegrated over the U.S.

Threats from Space Debris

- Collisions with **operational satellites**, disrupting communication and navigation.



- Hazards to **astronauts aboard the ISS** and future space missions.
- **Uncontrolled re-entries** posing risks to people, property, and infrastructure on Earth.

International Laws on Space Debris Responsibility

- **Outer Space Treaty (1967)**: Holds nations responsible for space activities, including private entities.
- **Liability Convention (1972)**: Establishes absolute liability for damage caused by space objects on Earth.

India's Space Debris Management Initiatives

- ISRO follows global debris mitigation guidelines (UN-COPUOS, IADC).
 - **Key Initiatives**: IS4OM: Focuses on spaceflight safety and debris mitigation.
 - **NETRA**: Enhances Space Situational Awareness (SSA).
 - **Debris-Free Space Missions (DFSM) Initiative (2024)**: Aims for debris-free missions by 2030 through:
 - Avoiding debris generation
 - Collision avoidance
 - Post-mission disposal

Challenges in Accountability

- Tracing ownership of **small debris** is difficult.
- Diplomatic and political hurdles **delay compensation**.
- **No penalties** for uncontrolled re-entries despite liability for damage.

Mitigation & Future Solutions

- **International Cooperation**: Strengthening UNCOPUOS frameworks.
- **Mandatory End-of-Life Plans**: Clear deorbiting strategies for satellites.
- **Active Debris Removal (ADR)**: Using technologies like ADRAS-J for clean-up.
- **Liability Insurance**: Ensuring financial accountability for space activities.
- **National Regulations**: Aligning policies with global space governance standards.

Conclusion : With rising **space activities**, **global cooperation**, **strict regulations**, and advanced technology are crucial for managing space debris and ensuring sustainable space operations.

Iran Declines to Resume Nuclear Deal Negotiations with the U.S.

Context: Iran has refused to resume negotiations with the U.S. on its nuclear program, **stating it will only engage with other JCPOA** (Joint Comprehensive Plan of Action) members (Europe, Russia, China).

Background: U.S.-Iran Nuclear Tensions

- **2015 JCPOA Agreement**: Iran agreed to limit nuclear activities in exchange for sanctions relief from the U.S., EU, and UN.

- **2018 U.S. Withdrawal**: The Trump administration withdrew from the deal and imposed maximum pressure sanctions, including on Iran's oil exports.
- **Iran's Response**: Iran resumed high-level uranium enrichment, raising concerns about its nuclear weapons capability.
- **2023 Developments**: Iran enriched uranium to near weapons-grade levels, while key JCPOA provisions expired.

Key Provisions of the JCPOA

Iran's Commitments

- **Nuclear restrictions**: No production of highly enriched uranium or plutonium for weapons.
- **Centrifuge limits**: Reduction in the number, type, and enrichment level of centrifuges.
- **IAEA monitoring**: Unrestricted inspections of declared and undeclared nuclear sites.

Global Commitments

- **Sanctions relief**: Lifting of nuclear-related sanctions; however, U.S. restrictions on missiles, terrorism support, and human rights remained.
- **Arms embargo**: UN restrictions lifted after five years, conditional on IAEA verification.
- **Snapback mechanism**: UN sanctions could be reinstated if Iran was found violating the deal.

Challenges in U.S.-Iran Negotiations

- **Mistrust**: Past violations hinder diplomatic progress.
- **Diverging agendas**: The U.S. seeks a broader agreement, while Iran demands JCPOA restoration without additional conditions.
- **Domestic politics**: Hardliners in both countries oppose compromise.

Possible Future Scenarios

Scenario	Potential Outcomes
Successful Negotiations	De-escalation, economic relief for Iran, nuclear restrictions in place.
No Deal / Status Quo	Continued nuclear buildup, more sanctions, regional instability.
Military Action	Risk of conflict in the Middle East, disruption of global oil markets.

Way Forward

- **Diplomatic engagement**: Reviving trust-based negotiations with multilateral mediation.
- **Regional security cooperation**: Preventing a nuclear arms race in the Middle East.
- **Economic and humanitarian measures**: Easing tensions through targeted relief while ensuring nuclear non-proliferation.

A resolution remains uncertain, but without diplomatic progress, tensions risk escalating into a larger regional crisis.

From Democracy to Emocracy: The Rise of Emotion-Driven Governance

Context: The Vice President of India recently called for a national debate on the **shift from democracy** to "**emocracy**," where emotion-driven policies and discourse undermine rational decision-making.

What is Emocracy?

Emocracy refers to the **increasing dominance of emotions over logic** in political decision-making. Unlike traditional democracy, which relies on **reasoned debates and evidence-based** policymaking, emocracy prioritizes populist sentiment, viral narratives, and psychological persuasion.

Drivers of the Shift to Emocracy

1. **Social Media & Digital Influence**: Viral narratives and misinformation override fact-based journalism.
2. **Political Messaging & Populism**: Leaders use emotional rhetoric to mobilize voters rather than policy-driven arguments.

Democracy vs. Emocracy: Key Differences

Feature	Democracy	Emocracy
Decision-Making	Rational, evidence-based	Emotion-driven, impulsive
Leadership Style	Accountable, policy-focused	Charismatic, populist
Public Engagement	Informed debates	Sentiment-driven reactions
Media Influence	Free press, investigative journalism	Sensationalism, misinformation
Governance Approach	Stability, institutional continuity	Short-term, reactionary policies

Drivers of the Shift to Emocracy

- Social Media & Digital Influence:** Viral narratives and misinformation override fact-based journalism.
- Political Messaging & Populism:** Leaders use emotional rhetoric to mobilize voters rather than policy-driven arguments.
- Identity Politics:** Caste, religion, and regional identities dominate electoral strategies.
- Appeasement Over Policy Reforms:** Short-term emotional appeals replace long-term governance planning.

Threats of Emotionally Driven Policies

- Populist Economics:**
 - Farm Loan Waivers:** Data (RBI, 2023) shows that only 30% of small farmers benefit, while state budgets suffer.
 - Free Electricity Schemes:** CAG (2021) reported rising debts in Punjab and Delhi's power sectors.
- Legal and Constitutional Risks:**
 - Demonetization (2016):** NSSO (2018) data showed 1.5 million job losses in the informal sector.
- Social & Economic Disruptions:**
 - COVID-19 Lockdown (2020):** CMIE (2021) reported 75 million job losses due to lack of planning.
- Policy Paralysis & Polarization:**
 - CAA (2019):** Nationwide protests delayed the NRC process, highlighting governance inefficiencies.

Why Emotionally Driven Policies Are Still Important?

- Social Justice & Equity:**
 - Reservations** for SCs, STs, OBCs: NITI Aayog (2023) reported significant literacy improvements among marginalized communities.
- Crisis Response & Welfare:**
 - PMGKY (2020):** Helped 80 million people during the pandemic with direct financial aid.
- National Identity & Unity:**
 - Swachh Bharat Abhiyan:** UNICEF (2021) reported a 60% reduction in rural open defecation due to behavior change.

Way Forward

- Data-Driven Governance:** Kerala's Nava Keralam Mission uses real-time analysis for health and education reforms.
- Social Media Regulation:** Stricter content moderation to curb misinformation.
- Reviving Rational Public Debates:** Universities and think tanks must lead evidence-based discussions.
- Institutional Reforms:**
 - FRBM Act:** Ensures fiscal responsibility.
 - 2nd ARC Recommendation:** Impact Assessment Committees for major policy rollouts.

Conclusion: While emotions can inspire **positive change**, governance must remain grounded in **reason and data-driven policies** to ensure sustainable progress. A balance between **rational policymaking and public sentiment** is key to strengthening democracy.

State vs. Centre: The Federal Dilemma in India's Health Sector

Context: Growing centralisation in health policymaking is raising concerns over states' autonomy and the effectiveness of India's federal health governance.

India's Health Governance Framework

- India follows a **quasi-federal structure** where both the Centre and states share health responsibilities.

- Health is a **state subject under the Constitution**, making states primarily responsible for healthcare delivery.
- However, the **Centre plays a crucial role** through funding, policy frameworks, and national programs.

Key Instances of Health Policy Centralisation

- Domicile-Based Medical Reservations Struck Down:** The Supreme Court ruled that domicile-based reservations in PG medical admissions violate Article 14 (Right to Equality), prioritising meritocracy over regional considerations.
- National Health Mission (2005):** Strengthened the Centre's role in health funding and policymaking, limiting states' financial and operational flexibility.
- Epidemic Act & Disaster Management Act:** Gave the Centre overriding authority during public health emergencies, limiting state control.
- Ayushman Bharat Digital Mission:** Aims to unify health records but restricts states' control over data-sharing and implementation mechanisms.
- Ayushman Bharat (2018):** A centrally sponsored health insurance scheme that reduced the role of state-run programs, shifting healthcare financing control to the Centre.
- National Medical Commission (NMC) Act (2019):** Replaced the Medical Council of India (MCI) with the NMC, increasing central oversight over medical education and licensing.
- 'One Nation, One Health System' Approach:** A proposed framework to unify health insurance schemes, raising concerns over loss of state autonomy in health financing.

Impact of Over-Centralisation on Federal Health Policy

- Limited Flexibility to Address Local Health Needs**
 - Health priorities vary across states; uniform policies overlook regional disparities.
 - Kerala needs geriatric care policies**, while Bihar & UP require stronger **maternal and child health** interventions.
 - Rigid central schemes** often fail to accommodate these state-specific requirements.
- Reduced State Autonomy in Healthcare Governance**
 - AB-PMJAY** limits states' flexibility in implementation, despite healthcare being a state subject.
 - Many states had successful **state-run insurance programs** but had to conform to central directives.
- Bureaucratic Delays and Inefficiencies**
 - States **depend on the Centre** for funds and approvals, leading to delays.
 - NHM fund disbursement** issues have slowed program execution.
 - COVID-19 pandemic response** faced hurdles due to centralised vaccine distribution and oxygen supply mismanagement.
- Financial Dependence on the Centre**
 - States rely on **Centrally Sponsored Schemes (CSS)** for healthcare funding.
 - The 15th Finance Commission's **health grants** impose strict central conditions on how states use resources.
- Weakening of Grassroots Public Health Systems**
 - Panchayats & municipal bodies, crucial for **last-mile healthcare**, are often sidelined.
 - Over-centralisation** disrupts local health service delivery.

Way Forward: Strengthening Cooperative Federalism

- Greater Fiscal Autonomy for States:** Allow states more flexibility in using central health funds based on regional needs.
- State-Specific Health Policies:** Encourage customized health strategies instead of uniform national policies.
- Empowering Local Governance:** Strengthen state health departments, municipalities, and panchayats for better service delivery.
- Collaborative Health Planning:** Institutionalise Centre-state coordination for inclusive decision-making.
- Capacity Building & Infrastructure Investment:** Provide technical and financial support to states to enhance healthcare systems.

Conclusion: Excessive centralisation in health policymaking undermines federalism and **weakens healthcare delivery**. A **balanced approach**—where states retain autonomy in implementation while leveraging **central support for funding** and coordination—is essential to build an efficient and equitable healthcare system. **Cooperative federalism** must be prioritised to ensure the well-being of all citizens.

Australia: A Key Partner in India's Growth

Context: India and Australia share a **deepening strategic and economic relationship**, making Australia a natural partner in India's development journey.

India-Australia Relations

- **Historical Ties:** Colonial-era connections and Commonwealth membership laid the foundation for post-independence diplomatic relations.
- **Political & Diplomatic Engagement:**
 - **Strategic Partnership (2009)** → Comprehensive Strategic Partnership (2020)
 - **QUAD Alliance:** Cooperation with the US and Japan for Indo-Pacific security.
 - **2+2 Ministerial Dialogue:** Strengthening defense and foreign policy coordination.

Economic & Trade Relations

- India is Australia's **5th largest trading partner**, with bilateral trade expected to reach \$50 billion by 2030.
- **Key Agreements:**
 - **Economic Cooperation & Trade Agreement (ECTA):** Reducing tariffs and boosting trade.
 - **Comprehensive Economic Cooperation Agreement (CECA):** Ongoing negotiations for enhanced investment and trade flows.
- **Complementary Economies:** Australia **supplies critical minerals** (lithium, nickel, cobalt), coal, and education services, supporting India's industrial and clean energy transition.

Defense & Security Cooperation

- **Mutual Logistics Support Agreement (MLSA):** Military base access for logistics.
- **Cyber & Critical Technology Cooperation:** Strengthening AI, cybersecurity, and digital governance.
- **Joint Defense Exercises:** Malabar, AUSINDEX, AUSTRALIND enhance military interoperability.

Cultural & Educational Ties

- **100,000+ Indian students** study in Australia.
- **Key Initiatives:**
 - **Maitri Scholarship Program:** Financial aid for Indian students.
 - **Research Collaborations:** MoUs between universities for joint research.
- **Indian Diaspora:** A vital cultural and economic link between both nations.

Future Growth Areas (Four 'Superhighways')

1. **Clean Energy:** Australia's expertise in renewables supports India's EV and green energy goals.
2. **Agribusiness:** Sustainable farming collaborations enhance India's food security.
3. **Education & Skills:** Expanding partnerships in higher education and vocational training.
4. **Tourism:** Strengthening cultural exchanges and economic ties.

Challenges in the Relationship

- **Visa & Immigration Policies:** Work permit and student visa concerns.

- **China's Influence:** Different trade dependencies impact strategic decisions.
- **Climate & Environmental Policies:** Differences in coal exports and climate commitments.

Conclusion: Australia's resources, **strategic alignment**, and economic complementarity make it a **crucial partner in India's growth**. Strengthening cooperation in trade, **security, education, and clean energy** can drive mutual prosperity and regional stability.

Mains Practice Questions

Governance & Social Issues

1. Discuss the major challenges faced by women in Panchayati Raj Institutions (PRIs). Suggest measures to enhance their participation and effectiveness. (GS2: Governance, Women Empowerment)
2. How does women's participation in the economy contribute to inclusive growth? Suggest policy measures to bridge gender disparities in India's workforce. (GS3: Inclusive Growth, GS1: Society)
3. Analyze the increasing role of emotions in shaping political discourse and governance. (GS2: Polity, Governance)

Economy & Agriculture

1. Evaluate the impact of Direct Benefit Transfer (DBT) schemes in improving welfare delivery in India. What challenges persist in its implementation? (GS3: Economy, Governance)
2. What are the major methodologies used for estimating poverty in India? Critically examine the challenges associated with poverty measurement and the need for a new approach. (GS3: Economy, Development Issues)
3. Analyze the implications of taxing virtual digital assets (VDAs) like cryptocurrencies in India. How can taxation policies balance innovation with financial regulation? (GS3: Economy, Taxation, Emerging Technologies)
4. Discuss the key factors driving India's agricultural exports. What challenges do Indian farmers and exporters face in global markets, and how can they be addressed? (GS3: Agriculture, Economy)

Health & Federalism

1. Assess the impact of the National Health Mission (NHM) in strengthening India's healthcare system. What are the existing challenges, and how can NHM be further improved? (GS2: Health, Governance)
2. Examine the increasing centralization of India's health policies. How can cooperative federalism be strengthened to ensure effective healthcare delivery? (GS2: Federalism, Health)

Science, Environment & International Relations

1. Explain the significance of the Antarctic Circumpolar Current (ACC) in global climate regulation. What could be the consequences of its slowing down? (GS1: Geography, GS3: Environment)
2. What is the Kessler Syndrome? Discuss its potential threats to space exploration and communication systems. Suggest strategies to mitigate the risks associated with space debris. (GS3: Science & Technology, Space)
3. Discuss the rationale behind the Reserve Bank of India's (RBI) liquidity infusion of \$21 billion. How does such a move impact inflation, financial markets, and economic growth? (GS3: Economy, Monetary Policy)

International Relations & Geopolitics

1. What are the key issues surrounding the Iran nuclear deal? Analyze the geopolitical and economic implications of Iran's refusal to resume negotiations with the U.S. (GS2: IR)
2. Discuss the growing strategic and economic partnership between India and Australia. How can both countries leverage their complementarities to strengthen bilateral relations? (GS2: IR)

NEWS IN BRIEF

PRESIDENT MURMU VISITS DHOLAVIRA

In News: The President of India visited Dholavira, a **UNESCO World Heritage Site** in Gujarat.

About Dholavira

- **Discovery:** Jagat Pati Joshi (1968).
- **Location:** Khadir Island, Kachchh, Gujarat; lies on the Tropic of Cancer.
- **Historical Significance:** 6th largest Harappan site (3000-1500 BCE).
- **UNESCO Status:** Listed as India's 40th World Heritage Site (2021).

Architectural Brilliance

- **Fortified City:** Castle, Bailey, Middle & Lower Towns, Ceremonial Ground.
- **Reservoirs:** Advanced water conservation systems.
- **Unique Use of Stone:** Unlike other Indus Valley sites, Dholavira extensively used stone instead of bricks.

Economic Significance

- **Trading Hub:** Copper, shells, semi-precious stones, timber.
- **Trade Routes:** Linked to Mesopotamia (Iraq), Magan (Oman), and other IVC cities.
- **Exports:** Beads, metals, pottery.

Decline of Dholavira

- **Climate Change:** Drying of Saraswati River.
- **Trade Disruptions:** Mesopotamian collapse affected commerce.
- **Desertification:** Rann of Kutch turned into a mudflat.



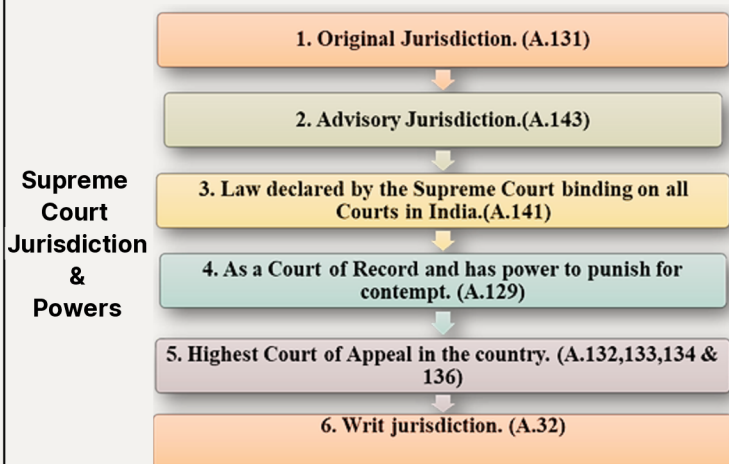
One of the water reservoirs, with steps, at Dholavira

ARTICLE 136 OF THE CONSTITUTION

In News: Vice President Jagdeep Dhankhar raised concerns over the misuse of Article 136 at an arbitration conference.

About Article 136

- **Special Leave Petition (SLP):** Grants the Supreme Court discretionary power to hear appeals from any court or tribunal in India.
- **Scope:** Applicable to both civil and criminal cases, even when no automatic right of appeal exists.
- **Discretionary Nature:** The Supreme Court is not obligated to accept all appeals under this provision.



HAIR LOSS & HIGH SELENIUM IN WHEAT

In News: An ICMR-AIIMS study found **elevated selenium levels in the blood and hair** of affected individuals, tracing it to wheat from PDS outlets.

About Selenium

- **Essential mineral** found in food and supplements.
- Occurs in **soil and groundwater in inorganic forms**, which plants convert into organic compounds like selenomethionine and selenocysteine.
- A vital component of **25 selenoproteins**, supporting thyroid function, DNA synthesis, reproduction, and oxidative protection.

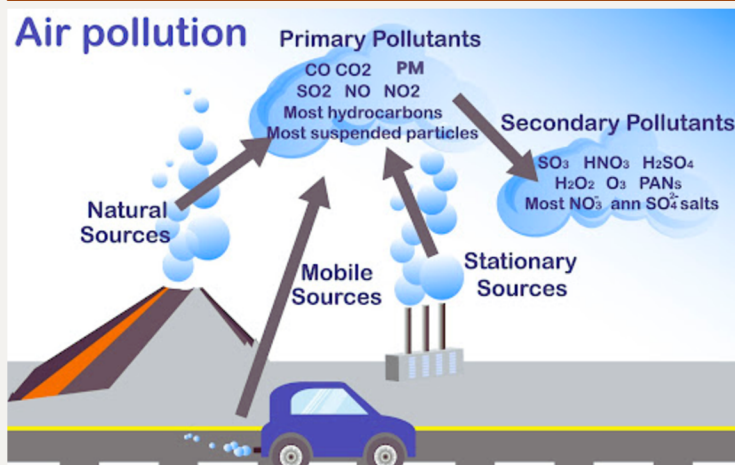
Uses

- **Glassmaking:** Decolorization & red pigments.
- **Electronics:** Photocells, light meters, solar cells.
- **Pigments:** Ceramics, paints, plastics.
- **Rubber Industry:** Enhances durability via vulcanization.

Selenium Toxicity (Selenosis)

- **Cause:** Excess intake from diet, supplements, or environmental exposure.
- **Symptoms:** Hair loss, as observed in Shegaon taluka due to high dietary selenium.

PM2.5: SOURCES AND HEALTH IMPACT



Context: A study in **Nature Communications** examines PM2.5 sources and health effects in Northern India, particularly the **Indo-Gangetic Plain**.

What is PM2.5?

- **Fine particulate matter (<2.5µm in diameter)** that can deeply penetrate the respiratory system, causing severe health issues.
- **Major sources:** Combustion activities, **industrial emissions**, vehicular pollution.

PM2.5 Sources in Northern India

- **Delhi:** Dominated by **ammonium chloride & organic aerosols** from vehicular emissions, residential heating, fossil fuel oxidation.
- **Outside Delhi:** Higher presence of **ammonium sulfate, ammonium nitrate**, and biomass-burning aerosols.
- **India's oxidative PM2.5** levels are among the highest globally, 5x higher than in China & Europe.
- **Winter emissions:** **Cow dung combustion** for heating and cooking contributes significantly.

Health Impacts of PM2.5

PM2.5 in Indian cities has **one of the highest oxidative potentials** globally, exceeding levels in China and Europe by up to 5 times.

Health Risks:

- **Respiratory diseases:** Asthma, bronchitis, COPD.
- **Cardiovascular issues:** Heart attacks, hypertension.
- **Neurological disorders:** Cognitive decline, neurodevelopmental issues.
- **Premature mortality:** Higher risk of early deaths due to lung and heart diseases.

ULTRA-CONSERVED ELEMENTS (UCES) IN DNA

News: Researchers have discovered ultra-conserved elements (UCEs) in the genome.

What are UCES?

- DNA segments **unchanged for over 80 million** years across species.
- Preserved due to **critical biological functions**.

Function of UCES:

- Regulate protein production** without coding for proteins.
- Act as **"poison exons"**, influencing gene expression.
- In the **Tra2b gene**, they prevent excess **Tra2β protein**, crucial for fertility.

Research Findings:

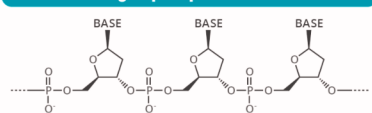
- Deleting the **Tra2b UCE in mice led to infertility** due to overproduction of Tra2β protein.
- Highlights the role of UCES in **genome stability** and evolution.

Significance:

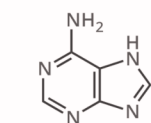
- Offers insights into how UCES help **regulate essential biological functions** like fertility.
- Advances understanding of **genetic evolution** and stability.

What makes up the chemical structure of DNA?

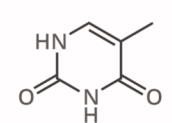
The sugar-phosphate backbone



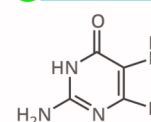
A Adenine



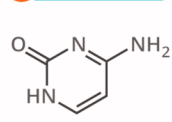
T Thymine



G Guanine

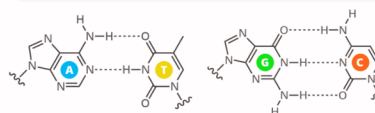


C Cytosine



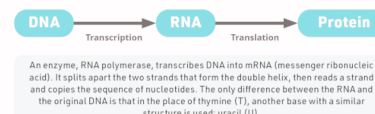
What holds DNA strands together?

DNA strands are held together by hydrogen bonds between bases on adjacent strands. Adenine (A) always pairs with thymine (T), while guanine (G) always pairs with cytosine (C). Adenine pairs with uracil (U) in RNA.



From DNA to proteins

The bases on a single strand of DNA act as a code. The letters form three letter codons, which code for amino acids - the building blocks of proteins.



An enzyme, RNA polymerase, transcribes DNA into mRNA (messenger ribonucleic acid). It splits apart the two strands that form the double helix, then reads a strand and copies the sequence of nucleotides. The only difference between the RNA and the original DNA is that in the place of thymine (T), another base with a similar structure is used: uracil (U).



In multicellular organisms, the mRNA carries genetic code out of the cell nucleus, to the cytoplasm. Here, protein synthesis takes place. 'Translation' is the process of turning the mRNA's 'code' into proteins. Molecules called ribosomes carry out this process, building up proteins from the amino acids coded for.

EXERCISE DESERT HUNT 2025

Context: The Indian **Air Force** conducted Exercise Desert Hunt 2025, a **Tri-Service** Special Forces drill at Air Force Station Jodhpur, Rajasthan.

About the Exercise:

- Involved Para** (SF) (Army), **MARCOS** (Navy), and **Garud** (SF) (Air Force).
- Aimed at **enhancing interoperability**, coordination, and combat readiness.
- Key operations:** airborne insertion, precision strikes, hostage rescue, counter-terrorism, combat free falls, and urban warfare under realistic conditions.

DOCTRINE OF EQUALITY

Context: The Supreme Court of India ruled that **visually challenged candidates cannot be deemed unsuitable** for judicial service, emphasizing the principle of inclusivity and equality in governance and public employment.

Key Rulings:

- Advocated adding disability as a **ground for non-discrimination** under Article 15.
- Opposed indirect discrimination**, such as rigid cut-offs or procedural barriers, that **exclude persons with disabilities (PwD)** from judicial service.

Right to Equality in India (Articles 14-18):

- Article 14:** Ensures equality before the law and equal protection of laws.
- Article 15:** Prohibits state discrimination based on religion, race, caste, sex, or place of birth; allows special provisions for vulnerable groups.
- Article 16:** Guarantees equal opportunities in public employment.
- Article 17:** Abolishes untouchability in all forms.
- Article 18:** Prohibits titles, except for military or academic distinctions.

FIREFLY'S BLUE GHOST: HISTORIC PRIVATE LUNAR LANDING

News: Firefly Aerospace's **Blue Ghost** lander successfully landed near Mons Latreille in Mare Crisium, marking the **first private upright lunar landing**.

About Blue Ghost:

- Part of **NASA's Commercial Lunar Payload Services (CLPS)** program.
- Supports **Artemis mission goals** for long-term lunar presence.
- Carries **ten scientific instruments**, including a lunar soil analyzer, radiation-tolerant computer, and drill system.
- Operational for **14 Earth days (one lunar day)**.

Lunar Landing Challenges:

- Thin atmosphere:** Requires thrusters for precise deceleration.
- Rugged terrain:** Increases landing risks.
- No atmospheric drag:** Parachutes are ineffective.

Upcoming Private Lunar Missions:

- Intuitive Machines' **Athena** lander – targeting the Moon's south pole.
- Japan's **ispac Resilience** lander – retrying after a 2023 failure.

Did You Know?

- Artemis Accords** (2020): Set space exploration principles, based on the 1967 Outer Space Treaty.
- India is a signatory to the Artemis Accords.**

SWAVALAMBINI: WOMEN ENTREPRENEURSHIP PROGRAMME

Context: The Ministry of Skill Development & Entrepreneurship (MSDE), in collaboration with NITI Aayog, launched Swavalambini to **support women entrepreneurs** in Higher Education Institutions (HEIs).

About:

- Aims to **equip young women with the mindset**, resources, and mentorship to build and scale ventures.
- Provides faculty **training, mentorship, funding** access, and networking opportunities.
- Offers **Entrepreneurship Development Programme (EDP)** covering business planning, leadership, financial literacy, and market research.

FERRIHYDRITE AND MARS' RED COLOR

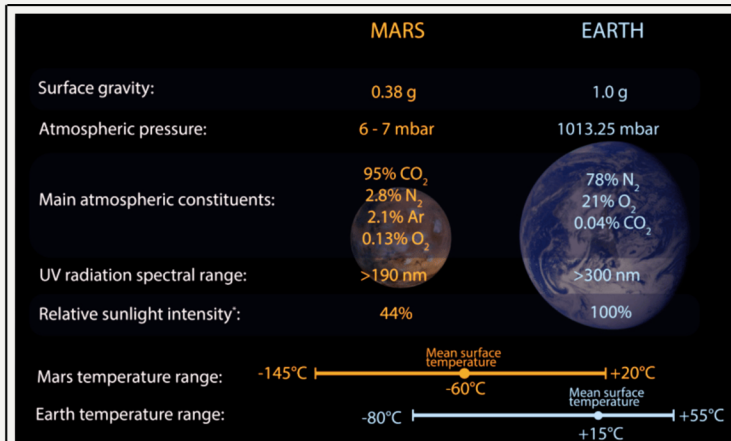
News: A joint NASA-ESA study suggests that **Mars' red color originates from ferrihydrite**, a mineral that forms in cool, water-rich conditions.

Key Findings:

- Formation:** Ferrihydrite **requires liquid water**, challenging the theory that Mars turned red solely due to slow oxidation in dry conditions.
- Habitability Implications:** Indicates that Mars may have **once had conditions suitable for life**, with prolonged water activity.
- Climate Insights:** Provides clues about **Mars' transition from a wet planet to its current dry state**.

About Mars: Fourth planet from the Sun, known for its rusty red appearance. **Moons: Phobos and Deimos.**

- Thin, dusty atmosphere:** 95.32% CO₂, 2.7% N₂, 1.6% Ar.



INDIA'S FIRST COMPREHENSIVE RIVER DOLPHIN SURVEY

News: India's first nationwide survey under Project Dolphin (2020) estimates **6,327 river dolphins**, mainly in the Ganga, Brahmaputra, and Indus river basins.

Key Findings:

- India hosts two freshwater dolphin species:
 - Ganges River Dolphin** (*Platanista gangetica*): 6,324 individuals.
 - Indus River Dolphin** (*Platanista minor*): **3 individuals in Beas River**.
- Highest populations recorded in **Uttar Pradesh**, followed by Bihar, West Bengal, and Assam.

Ganges River Dolphin

- Traits:** Functionally **blind**, **relies on echolocation**; called Susu due to its breathing sound.
- Habitat:** Found in the **Ganga and Brahmaputra river** basins (India, Nepal, Bangladesh).
- Threats:** Habitat destruction, pollution, hunting.
 - Conservation Status:** Wildlife (Protection) Act, 1972: Schedule I
 - IUCN Red List:** Endangered
 - CITES & CMS:** Appendix I
 - Recognitions:** India's National Aquatic Animal (2009), State Aquatic Animal of Assam

Indus River Dolphin

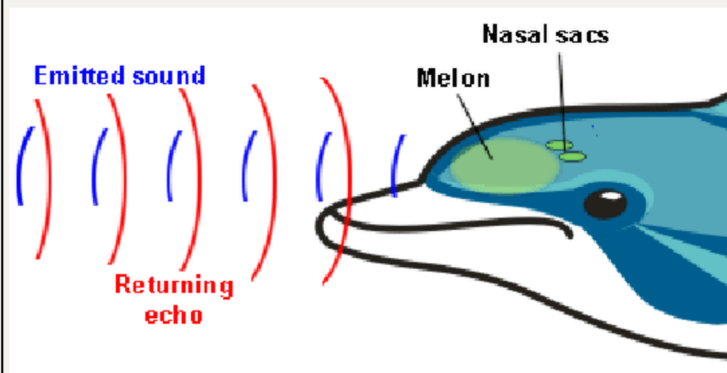
- Traits:** Functionally blind, uses echolocation; locally called Bhulan.
- Habitat:** Mainly in Pakistan's Indus River System, with a small population in India's Beas River.
- Threats:** Habitat fragmentation, restricted range, isolation.
 - Conservation Status:** Wildlife (Protection) Act, 1972: Schedule I
 - IUCN Red List:** Endangered
 - CITES:** Appendix I
 - Recognitions:** State Aquatic Animal of Punjab

Did You Know?

- Irrawaddy Dolphins** are found in **Odisha's Chilika Lake**, Asia's largest brackish water lagoon.
- Unlike river dolphins, **they have vision, a bulbous head**, and no beak.
- IUCN Red List:** Critically Endangered.

Importance of River Dolphins

- Indicators** of freshwater ecosystem health.
- Aid in **carbon sequestration**, flood regulation, and water purification.
- Maintain ecological balance** by controlling fish populations.
- Hold **cultural, religious significance** and support sustainable tourism.



CITIES COALITION FOR CIRCULARITY (C-3) LAUNCHED

Context: India launched the **Cities Coalition for Circularity (C-3)** at the 12th **Regional 3R and Circular Economy Forum** in Jaipur, promoting global city-to-city collaboration for sustainable urban development.

Key Highlights

- The Prime Minister emphasized India's **Pro-Planet People (P3) approach** and the importance of the 3R principles (Reduce, Reuse, Recycle).
- A **Memorandum of Understanding (MoU)** for **CITIIS 2.0** was signed, with ₹1,800 crore allocated for 18 cities in 14 states.
- The initiative aligns with the **Hanoi 3R Declaration** (2013-2023) and ongoing negotiations for a Global Plastic Treaty.

About C-3

A multi-nation alliance **promoting circular economy** principles in urban planning, waste management, and resource efficiency.

Importance for Urban Sustainability

- Reduces waste** and lowers emissions
- Boosts recycling**, remanufacturing, and green industries
- Enhances **city resilience** by reducing reliance on finite resources
- Creates jobs** in renewable energy and eco-friendly industries
- Improves public health** and urban spaces

Challenges

- Lack of awareness** and expertise
- High initial costs
- Resistance** from businesses and consumers
- Weak policy enforcement

Way Forward

- Strengthen circular** economy policies
- Invest in **sustainable innovations**
- Educate** communities on circular living
- Foster **public-private partnerships**

BOSE METAL

News: Researchers from China and Japan have found evidence that **niobium diselenide (NbSe₂)** can exhibit Bose metal behavior.

What is a Bose Metal?

- A metal that forms **Cooper pairs below a critical temperature** but does not transition into a superconductor.
- Unlike superconductors, Bose metals **retain some resistance**, offering enhanced conductivity.
- Challenges traditional theories**, which predict metals at absolute zero should either be superconductors or insulators.

Applications

- Quantum Computing:** Potential for qubit development.
- Condensed Matter Research:** Helps study quantum phases and disordered metals.
- Advanced Electronics:** May influence next-gen electronic devices.
- Superconductivity Research:** Aids in understanding high-temperature superconductors.

Limitations

- No immediate practical applications.
- Requires **precise experimental** conditions.
- Debate over its classification as a distinct quantum state.

IMF CONCERNS ON NBFCs

News: The IMF has warned of financial instability in India due to NBFCs' high exposure to the power and infrastructure sectors.

Key Highlights

- Report:** India Financial System Stability Assessment focuses on power sector loans.
- Concerns:**
 - NBFCs' **rising dependence** on bank borrowings.
 - 63% of power sector** loans in FY24 came from top three Infrastructure Financing Companies (IFCs).
 - Structural challenges** in the power sector amplify financial risks.
 - PSBs may **struggle to maintain a 9%** capital adequacy ratio in stagflation scenarios.
 - State-owned NBFCs** are exempt from large exposure limits, raising regulatory concerns.

Recommendations

- **Strengthen liquidity regulations** for NBFCs, especially in infrastructure financing.
- **Enhance risk management** and regulatory parity between state-owned and private NBFCs.
- **Improve data sharing** on NBFC credit and exposure.
- **Prioritize financial stability** over developmental motives for banks.

NBFCs Overview

- Provide **financial services** but **cannot accept demand deposits** or issue cheques.
- **Regulated by RBI** and the Ministry of Corporate Affairs.
- Unlike banks, NBFC deposits are not insured.

INDIA'S AI SAFETY INSTITUTE

Context: India will launch an **indigenous AI model** and establish the **AI Safety Institute (AISi)** under the **IndiaAI Mission** to ensure safe and responsible AI development.

Key Highlights

- **Global AI Safety Efforts:**
 - The **U.K., U.S., Singapore**, and Japan have set up AI Safety Institutes to address AI risks.
 - The **U.K.'s Inspect platform evaluates AI models**; the U.S. formed a task force for national security; Singapore focuses on safe model design.
- **India's AISi:**
 - Operates under the **Safe and Trusted AI pillar**.
 - **Collaborates** with academia, startups, industry, and government.
 - Develops **indigenous AI safety tools** while aligning with global standards.
 - Partners with **MeitY and UNESCO** to address **AI ethics** and governance.

Importance

- **Addresses AI risks** like bias, discrimination, and privacy concerns.
- Influences **global AI governance** discussions on risks, mitigation, and standardization.
- Positions India as a **key voice for the Global South** in AI safety.

WALLACE LINE

Context: A key **biogeographic boundary** explaining species distribution differences between Asia and Australia.

What is the Wallace Line?

- Identified by **Alfred Russel Wallace** in the 19th century, it separates **Asiatic species** (west) from a mix of Asian and **Australian species** (east).
- Despite narrow gaps (~35 km), **species variation** is stark.

Geographic Extent

- Runs through the **Lombok Strait** (Bali-Lombok) and **Makassar Strait** (Borneo-Sulawesi).
- Extends eastward beyond **Mindanao Island** into the Philippine Sea.



Findings on Sulawesi Island

- In 1876, it was noted that the **island had affinities with Africa, India, Java, Maluku Islands, New Guinea, and the Philippines**.
 - Also there is a **unique mix of species** from both Asia and Australia.
 - **Asian species:** Tarsiers (family Tarsiidae), Lowland anoa (Bubalus depressicornis) and Mountain anoa (Bubalus quarlesi).
 - **Australian species:** Dwarf cuscus

REAL ESTATE REGULATORY AUTHORITY (RERA)

Context: The Supreme Court criticized RERA, calling it a **"rehabilitation center for former bureaucrats."**

About RERA

- **Enacted in 2016** to regulate the real estate sector, ensuring transparency and protecting homebuyers.
- **Land is a State subject**, but RERA applies nationwide.

Key Provisions

Regulatory Bodies

- **State RERA:** Registers projects, maintains transparency, and ensures compliance.
- **Appellate Tribunal:** Handles appeals and ensures speedy dispute resolution.

Financial Safeguards

- **Escrow Account:** 70% of buyers' funds secured for construction.
- **Advance Limit:** Developers cannot take over 10% of the cost without an agreement.

Buyer Protections

- **Carpet Area Pricing:** Charges based on usable floor space.
- **Timely Completion:** Delays lead to penalties.
- **Structural Liability:** Developers must fix defects for five years.

Penalties & Legal Compliance

- **Equal penal interest** for delays by developers and buyers.
- **Imprisonment:** Up to 3 years for developers, 1 year for agents/buyers for non-compliance.

OFFSHORE MINING

News: The **Kerala Assembly** passed a resolution **opposing the** Central government's **offshore mining** plans along its coast.

About Offshore Mining

- **2023 Amendment:** The Offshore Areas Mineral (Development and Regulation) Act, 2002, was amended to allow the Union Ministry of Mines to auction deep-sea mineral blocks.
- **Definition:** Extraction of minerals from the deep seabed (below 200m depth).

Types of Resources

- **Oil & Gas:** Extracted via offshore rigs.
- **Minerals:** Includes polymetallic nodules, rare metals.
- **Sand & Gravel:** Used in construction.

Concerns

- **Habitat Destruction:** Mining robots damage marine ecosystems.
- **Sediment Plumes:** Smother marine life and reduce water quality.
- **Technical Challenges:** Repairing deep-sea equipment is difficult.
- **Ethical Issues:** Companies like Google, BMW oppose seafloor mining over environmental concerns.

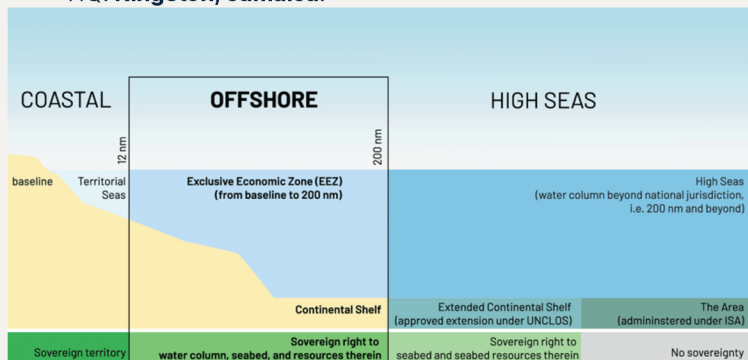
Regulatory Framework

UNCLOS (1982)

- Governs **ocean resources** and mining activities.
- Established the **International Seabed Authority (ISA)** to regulate seabed mining.

International Seabed Authority (ISA)

- Formed under UNCLOS to oversee **mining beyond national waters**.
- Members: 169 countries, including India.
- HQ: **Kingston, Jamaica**.



VANTARA

News: Prime Minister inaugurated Vantara, **the world's largest wildlife rehabilitation center in Jamnagar, Gujarat.**

About Vantara

- A wildlife **conservation, rescue, and rehabilitation** initiative providing a safe haven for over 1.5 lakh rescued, endangered, and threatened animals.
- Aims to offer rescued wildlife a **second chance at life.**

Awards & Recognition

- Awarded the '**Prani Mitra**' National Award (Corporate Category) by the Central Government.
- Recognized for **elephant rescue, treatment,** and care through the Radhe Krishna Temple Elephant Welfare Trust (RKTEWT).

SEMI-CRYOGENIC ENGINES TRAILS BY ISRO

News: ISRO successfully conducted **the Power Head Test Article (PHTA)** for the **SE2000 semi-cryogenic engine**, a key step in its development.

Power Head Test Article (PHTA)

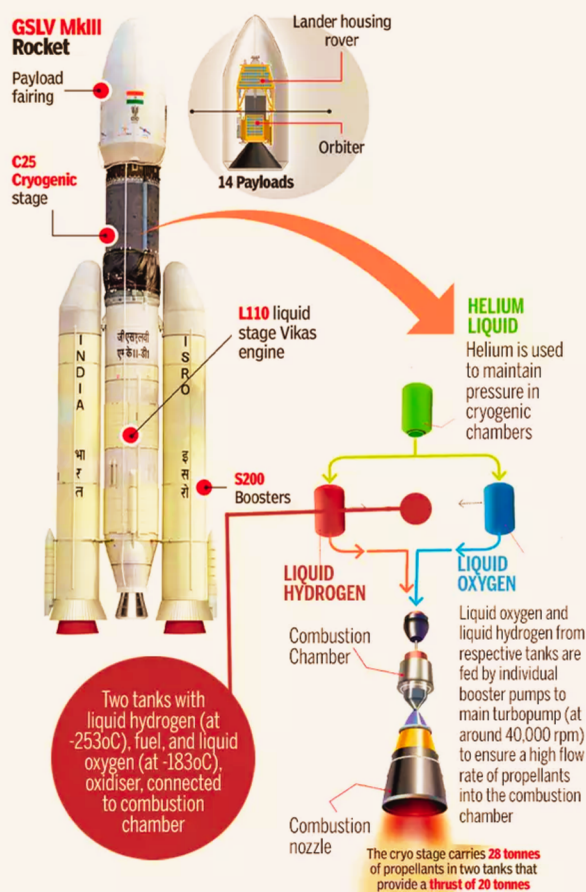
- **Purpose:** Tests critical subsystems like the gas generator, turbo pumps, pre-burner, and control components.
- **Significance:** Essential for semi-cryogenic engine development.

Semi-Cryogenic vs. Cryogenic Engines

- **Semi-Cryogenic Engine:** Uses liquid oxygen (LOX) and kerosene, offering higher thrust (2,000 kN), better payload capacity, and easier handling.
- **Cryogenic Engine:** Uses LOX and liquid hydrogen (LH2) but requires extremely low temperatures (-253°C) for storage.

Next-Gen Launch Vehicle (NGLV)

- Human-rated, **high-payload, reusable launch vehicle** for future Gaganyaan missions.
- Features a **reusable first stage** and can carry up to 30 tons to Low Earth Orbit (LEO).
- First and second stages use **LOX engines**, with a cryogenic upper stage.
- ISRO has successfully tested **first-stage recovery for reusability.**



DOCTRINE OF REASONABLE CLASSIFICATION

News: The Supreme Court's ruling in **State of West Bengal v. Anwar Ali Sarkar** (1952) established the reasonable classification test under Article 14 of the Indian Constitution.

Key Points

- The West Bengal **Special Courts Act**, 1950 was struck down for **creating arbitrary classifications** between accused persons, violating equality before the law.

Article 14: Equality Before Law

- Ensures **equality before the law and equal protection** of laws for all, including citizens and foreigners.
- Applies to **legal entities like corporations** and societies.

Important Judgments

- **E.P. Royappa v. State of Tamil Nadu** (1973): Expanded Article 14 to prohibit arbitrary state action, not just discrimination.
- **Ram Krishna Dalmia v. Justice Tendolkar** (1958): Clarified that Article 14 **prohibits class legislation** but allows reasonable classification for legislative purposes.

AGRICULTURAL INFRASTRUCTURE FUND (AIF) SCHEME

News: Punjab has fully utilized its **₹4,713 crore allocation** under the Agricultural Infrastructure Fund (AIF) scheme.

About AIF

- Launched to **provide medium-to-long-term financing for post-harvest agricultural infrastructure** projects.
- Operates from **2020-21 to 2032-33 with a ₹1 lakh crore loan provision at a 9% interest rate cap.**
- **Eligible applicants:** Farmers, agripreneurs, FPOs, cooperatives, startups, state agencies, and PPPs.

Key Features

- **Viable Farming Assets:** Supports community farming infrastructure.
- **Integrated Processing Projects:** Covers primary & secondary processing, but standalone secondary projects remain under MoFPI schemes.
- **PM-KUSUM Component-A:** Integrated with AIF.
- **Interest Subvention:** 3% annual interest subvention on loans up to ₹2 crore.
- **Credit Guarantee:** Coverage through CGTMSE.

RUELLIA ELEGANS: A THREAT TO ASSAM'S BIODIVERSITY

News: A recent study highlights the threat of *Ruellia Elegans* to Assam's **native biodiversity.**

About *Ruellia Elegans*

- Also known as **Brazilian petunia**, Christmas pride, and wild petunia.
- **Native to Brazil**, featuring bright red trumpet-shaped flowers.
- Belongs to the Acanthoideae sub-family and is **one of four invasive *Ruellia* species in India**, alongside *Ruellia ciliatiflora*, *Ruellia simplex*, and *Ruellia tuberosa*.
- India has **six native *Ruellia* species**, including *Ruellia beddomei*, *Ruellia malabarica*, and *Ruellia patula*.

What Are Invasive Species?

- **Non-native plants** that spread aggressively, competing with native flora for sunlight, water, and nutrients.
- **They disrupt ecosystems by:**
 - **Displacing native species** and altering biodiversity.
 - **Threatening endemic plants**, leading to their decline or extinction.



INDIA: 3RD LARGEST BIOFUEL PRODUCER

Context: India has become the world's third-largest biofuel producer. India achieved **19.6% ethanol blending** in petrol (as of January), ahead of its 2030 target.

Biofuels: Alternative fuels **derived from plant-based** sources. Examples include Bioethanol, Biodiesel, Green Diesel, Biogas.

Generations of Biofuels:

- First Generation:** From food crops like corn, sugarcane, and vegetable oils.
- Second Generation:** Made from agricultural waste and non-food feedstocks.
- Third Generation:** Derived from algae and microorganisms.
- Fourth Generation:** Uses genetically modified crops and synthetic biology.

Key Government Schemes:

- National Policy on Biofuels**
- Pradhan Mantri JI-VAN Yojana** – Promotes 2G ethanol from agricultural waste.
- GOBAR-Dhan Scheme** – Supports biogas and bio-CNG production.
- SATAT Scheme** – Targets 5,000 compressed bio-gas (CBG) plants by 2025.

Significance of Biofuel Expansion

- Saved **₹85,000 crore in foreign exchange** by reducing crude oil imports.
- Strengthened the **sugar industry** and boosted farmer incomes.
- ₹23,100 crore paid to farmers** in 2023-24 through ethanol production.
- Significant CO₂ emission reduction**, equivalent to planting 175 million trees.
- Promotes a circular economy** by converting waste into energy.

Challenges

- Sugarcane-based ethanol is **water-intensive**.
- Slow adoption of 2G biofuels** due to high costs and evolving technology.
- Limited ethanol blending** infrastructure (pipelines, storage, refineries).
- Transportation difficulties** due to ethanol's flammability.

Way Forward

- Strengthen financial** incentives for advanced biofuels.
- Expand **biogas and bio-CNG** adoption in transport.
- Invest in biofuel R&D** for cost reduction and efficiency improvement.

National Bio Fuel policy 2018

Creating a suitable environment for biofuels & its integration with main fuels.

₹

VGF for 2G ethanol Bio-refineries of Rs. 5000 Cr. in 6 years.

Higher purchase price and additional tax incentives as compared to 1G Biofuels.

🌱

Expansion in scope of raw materials like **sweet sorghum**, **starch containing materials** & **waste food grains** unfit for consumption to be used for ethanol production.

🏠

Cleaner Environment
30 Lakh tonnes of lesser CO₂ emissions for the ethanol supply year 2017-18.
Reduction in crop burning & conversion of agri waste to bio fuels will further reduce green house gas emissions.

🏭

Reduction in import dependency
The ethanol supply year 2017-18 is likely to see a supply of around **150 crore ltrs** of ethanol resulting in savings of over **Rs. 4000 Crore** of forex.

💰

Additional income to Farmers
Adopting 2G technologies, **agricultural residues** which otherwise are burnt by farmers can be **converted to ethanol** resulting in **income from these waste**. Conversion of surplus grains & gricultural biomass can help in price stabilization.

🚗

Health Benefits
Used cooking oil is a potential feedstock for bio diesel. Its use for making bio diesel will **prevent diversion of used cooking oil** in the food industry.

🏭

MSW Management
Converting the estimated 62 MMT MSW with available technologies into bio fuels has the potential to provide around **20% of drop-in fuels**.

🐦 dpradhanbjp
🌐 dpradhanbjp.com
👤 dharmendrapradhanodisha

GROWTH OF INDIA'S BIOECONOMY

Context: India's Bioeconomy has **grown over tenfold** in the last decade, reaching \$130 billion in 2024, with projections to hit \$300 billion by 2030.

What is Bioeconomy?

Bioeconomy refers to the **knowledge-driven use of biological resources** for sustainable economic growth across sectors like:

- BioPharma:** Pharmaceuticals, medical devices, lab-grown organoids.
- BioAgri:** GM crops, precision agriculture (e.g., Bt Cotton).
- BioIndustrial:** Bio-based chemicals, enzyme-based production.

India's Bioeconomy Growth

- Ranked 12th** globally and 3rd in the Asia-Pacific in biomanufacturing.
- Contributes 4% to GDP**, employing over 2 million people.
- India moved from 81st (2015) to 40th (2024) in the **Global Innovation Index**.

Government Initiatives

- BIRAC** (Biotechnology Industry Research Assistance Council) supports biotech startups.
- Startup India & Make in India** boost biotech innovation.
- Policies like PLI Schemes, Draft R&D Policy 2021, and clinical trial reforms make India a global biotech hub.

Challenges

- Global Competition:** Advanced infrastructure in the USA, EU, and China.
- IP Protection Issues:** Weak enforcement affects innovation.
- Infrastructure Gaps:** Limited biotech R&D facilities.
- Brain Drain:** Talented researchers move abroad.

Way Forward

- Increase **public-private investments** in biotech R&D.
- Foster **global collaborations** for technology sharing.
- Establish **innovation clusters** linking academia, industry, and government.

GROWTH OF INDIA'S BIOECONOMY

News: The Supreme Court has sought a **response from Uttarakhand's Chief Secretary** over alleged **misuse of Compensatory Afforestation Fund Management and Planning Authority (CAMPA)** funds.

What is CAMPA?

- Established under the Compensatory Afforestation Fund (**CAF Act, 2016**) (rules notified in 2018).
- Aims to compensate for forest loss** due to land diversion for non-forest use.

Fund Structure

- National CAMPA Fund:** Managed by the Central Government.
- State CAMPA Fund:** Managed by State Governments/UTs.

Purpose

- Used for afforestation**, forest restoration, biodiversity conservation, and wildlife habitat improvement.
- Funds are non-lapsable** and earn interest as per government rates.

BANGUS VALLEY - J&K

News: The Jammu and Kashmir government plans to develop Bangus Valley, near the **Line of Control (LoC)**, as an ecotourism destination.

About Bangus Valley

- Located in **Kupwara district**, Jammu and Kashmir.
- Part of the **Pir Panjal Range** in the Himalayas.
- Comprises **Lashadthura and Boud-Bangus** meadows, forming a twin-valley system.
- Holds **cultural significance** for the Gujjar and Bakarwal nomadic tribes.



PRELIMS QUESTIONS

1. Which of the following best describes the objective of the Agricultural Infrastructure Fund (AIF) scheme?
 - a) Providing direct cash transfers to farmers
 - b) Financing post-harvest agricultural infrastructure projects
 - c) Promoting organic farming techniques
 - d) Ensuring minimum support price (MSP) for crops
2. Which propellants are used in semi-cryogenic engines developed by ISRO?
 - a) Liquid Oxygen (LOX) and Liquid Hydrogen (LH2)
 - b) Liquid Oxygen (LOX) and Kerosene
 - c) Solid Propellant and Liquid Oxygen (LOX)
 - d) Methane and Liquid Hydrogen (LH2)
3. The doctrine of reasonable classification, as upheld by the Supreme Court under Article 14, allows classification based on which of the following conditions?
 1. It should be based on intelligible differentia.
 2. It should have a rational nexus with the objective of the law.
 3. Select the correct answer using the codes below:
 - a) 1 only
 - b) 2 only
 - c) Both 1 and 2
 - d) Neither 1 nor 2
4. Consider the following statements regarding offshore mining:
 1. It involves extracting minerals only from continental shelves.
 2. The International Seabed Authority (ISA) regulates mining beyond national jurisdiction.
 3. Which of the above statements is/are correct?
 - a) 1 only
 - b) 2 only
 - c) Both 1 and 2
 - d) Neither 1 nor 2
5. Under the RERA Act, which of the following is NOT a key function of the regulatory authority?
 - a) Ensuring timely completion of real estate projects
 - b) Regulating land acquisition by private developers
 - c) Protecting home buyers' interests
 - d) Ensuring fair transaction practices in real estate
6. The Cities Coalition for Circularity (C-3) aims to promote:
 - a) Sustainable urban waste management
 - b) Smart city infrastructure development
 - c) Affordable urban housing solutions
 - d) Expansion of renewable energy in cities
7. The red color of Mars is primarily due to the presence of which of the following minerals?
 - a) Hematite
 - b) Ferrihydrite
 - c) Magnetite
 - d) Limonite
8. The Swavalambini initiative aims to support:
 - a) Rural artisans in traditional crafts
 - b) Women entrepreneurs through financial assistance and training
 - c) Women's education in STEM fields
 - d) Self-help groups in agricultural marketing
9. PM2.5 particles are considered hazardous because:
 1. They can penetrate deep into the lungs and bloodstream.
 2. They are primarily emitted from natural sources like oceans.
 Select the correct answer:
 - a) 1 only
 - b) 2 only
 - c) Both 1 and 2
 - d) Neither 1 nor 2
10. Firefly's 'Blue Ghost' mission is significant because it:
 - a) Became the first private lander on the Moon
 - b) Is a Mars-bound space probe
 - c) Aims to study Saturn's moon Titan
 - d) Deploys small satellites in low Earth orbit
11. The principle of 'equality before law' under Article 14 of the Indian Constitution is derived from which country's legal system?
 - a) USA
 - b) UK
 - c) France
 - d) Germany
12. Ultra-Conserved Elements (UCEs) in DNA are significant because they:
 - a) Remain unchanged across multiple species over millions of years
 - b) Mutate rapidly, aiding evolution
 - c) Exist only in human genomes
 - d) Are responsible for genetic disorders
13. Article 136 of the Indian Constitution deals with:
 - a) The advisory jurisdiction of the Supreme Court
 - b) The power of the President to grant pardons
 - c) Special leave petitions in the Supreme Court
 - d) The procedure for constitutional amendments
14. Excessive selenium consumption, linked to hair loss, is most commonly associated with which of the following food sources?
 - a) Rice
 - b) Wheat
 - c) Maize
 - d) Pulses
15. Dholavira, a UNESCO World Heritage Site, was a part of which ancient civilization?
 - a) Mesopotamian Civilization
 - b) Egyptian Civilization
 - c) Indus Valley Civilization
 - d) Persian Civilization

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