

WEEKLY UPDATES

DATE : 12TH – 18TH AUGUST

POLITY & GOVERNANCE

DNA Profiling in the Justice System

Why in News?

- The **June 2024 Madras High Court decision** overturned a POCSO Act conviction, stressing the need for corroborating evidence rather than solely relying on DNA profiling.

What is DNA Profiling?

- **DNA Profiling:** Identifies individuals by analyzing unique regions of their DNA, especially **Short Tandem Repeats (STRs)**.
- **DNA Structure:** Organized into **23 pairs of chromosomes** inherited from both parents, made of four nucleotides (**Adenine, Guanine, Thymine, Cytosine**).
- **Sources:** Extracted from blood, saliva, semen, etc.
- **Process:**
 1. **Isolation:** Extracting DNA from samples.
 2. **Purification & Quantitation:** Ensuring purity and concentration.
 3. **Amplification:** Replicating genetic markers.
 4. **Visualization & Genotyping:** Identifying DNA sequences.
 5. **Statistical Analysis:** Comparing DNA profiles and calculating match probability.

Legal Use of DNA Profiling

- **Matching Outcomes:** Three results - Match, Exclusion, Inconclusive.
- **Statistical Support:** A "random occurrence ratio" indicates the likelihood of similar profiles in the population but does not conclusively prove identity.

Legal Provisions on DNA Profiling in India

- **Indian Constitution:**
 - **Article 20(3):** Protection against self-incrimination.
 - **Article 21:** Right to life and liberty.
- **CrPC 1973:** Sections **53** and **53A** allow DNA profiling for suspects, especially in rape cases.
- **Indian Evidence Act, 1872:** Sections **45-51** permit expert testimony, including DNA evidence.
- **Judicial Precedents:**
 - **Pattu Rajan v. State of T.N. (2019):** DNA evidence's probative value varies by case.
 - **Sharda v. Dharmal (2003):** Courts can mandate medical exams, including DNA profiling.
 - **Das @ Anu v. State of Kerala (2022):** DNA samples do not violate **Article 20(3)**.
- **Law Commission: 271st report (2017)** called for comprehensive DNA profiling laws, leading to the **DNA Technology Bill, 2019**.

Limitations of DNA Profiling

- **Environmental Stress:** DNA degrades due to environmental factors.
- **Reliability Issues:** Contamination and improper handling can affect results.
- **Cost:** DNA analysis is expensive.
- **Legal Challenges:** Courts must weigh DNA evidence with other corroborative evidence.

Way Forward

- **Improve Accuracy:** Invest in R&D to enhance DNA profiling and standardize forensic lab procedures.
- **Ensure Fair Trials:** Courts should rely on corroborating evidence alongside DNA.
- **DNA Technology Bill:** Revise the bill to address privacy concerns and establish strong safeguards.
- **Transparency:** Ensure clear procedures for DNA evidence handling to maintain public trust.

US Antitrust Ruling Against Google

Context

- US District Judge Amit Mehta ruled on August 5 that Google violated antitrust laws by maintaining a monopoly in search services and search ads through exclusive deals with Apple and Samsung.

What are Antitrust Issues?

- Antitrust laws promote fair competition and prevent monopolies or anti-competitive practices, ensuring consumer choice and market fairness.

Google's Violation of Antitrust Laws

- Google holds over 89% share in general search and 95% on mobile.
- Google spent USD 26 billion annually to maintain its default search engine status through exclusive agreements, blocking competitors from gaining market share.
- In India, the Alliance of Digital India Foundation (ADIF) has accused Google of stifling competition, raising concerns about its Privacy Sandbox initiative.

Big Tech Firms

- Big Tech refers to dominant technology companies like Google, Amazon, Apple, Facebook (Meta), and Microsoft that control significant sectors of the digital economy.

Need for Regulation

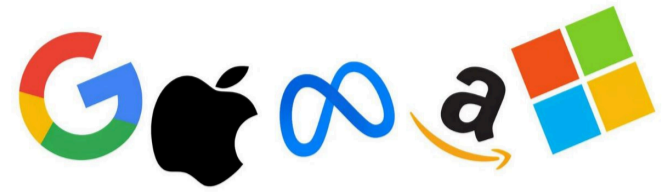
- Arbitrary Pricing: Big Tech's pricing influence raises fairness concerns.
- Regulatory Challenges: Difficulty in keeping up with rapid innovation.
- Data Privacy: Extensive data collection raises privacy and surveillance concerns.

Concerns with Big Tech

- Self-Preference: Big Tech favors its own services, reducing consumer choice.
- Non-Compliance: Investigations into Google and other firms for violating the Digital Markets Act (DMA) in Europe.
- Reducing Choices: Google's monopoly limits search quality and consumer options.
- Ecosystem Captivity: Apple's ecosystem practices limit user flexibility.
- Binary Choice: Meta's ad-free or personalized ad model fails to offer genuine alternatives.

Recommendations from the Standing Committee on Finance (2022)

- Digital Markets Regulation: Identify Systemically Important Digital Intermediaries (SIDIs) for yearly monitoring by CCI.
- Digital Competition Act: Introduce laws for a fair digital ecosystem.
- Data Usage: Ensure responsible handling of user data by SIDIs.
- Revamping CCI: Strengthen with a specialized unit for digital markets.



Existing Regulations in India

- Competition Act, 2002: Regulates antitrust practices, with the Competition Commission of India (CCI) overseeing Big Tech.
- Competition Amendment Bill, 2022: Strengthens CCI's role in digital sectors.
- IT Act, 2000: Provides a legal framework but needs updates for modern technology challenges.
- Industry Self-Regulation: Codes of conduct are developed but lack enforceability.

Global Regulation Examples

- Europe: DMA and DSA regulate digital platforms and ban harmful practices.
- USA: Antitrust legislation targets Big Tech's dominance.
- Australia: Regulates Facebook and Google to enhance media competition and online safety.

Global Cooperation for Technology Governance

- Information Sharing: Adopt global best practices like the EU's Digital Services Act.
- Harmonization: Standardize global regulations, such as algorithmic accountability.
- Capacity Building: Provide technical assistance to developing countries.

Delhi HC Questions Unnatural Sex Provisions in BNS 2023

Context:

The **Delhi High Court** has raised concerns over the exclusion of penal provisions for **unnatural sex** and **sodomy** in the newly enacted **Bharatiya Nyaya Sanhita (BNS) 2023**, which replaced the **Indian Penal Code (IPC) 1860**. The absence of provisions equivalent to **Section 377 of the IPC**, which previously criminalized **non-consensual unnatural sex**, has sparked debate.

Key Concerns:

- **Unnatural Offenses:** **Section 377 of the IPC** addressed **unnatural offenses**, defining them as **voluntary carnal intercourse against the order of nature** with any man, woman, or animal. The **Supreme Court decriminalized consensual same-sex relationships in 2018**, but the law still protected against **non-consensual unnatural sex**.
- **Protection Gaps:** The exclusion of these provisions from **BNS 2023** has raised concerns about the **lack of legal protection** for **male victims of sexual assault, vulnerable groups**, and members of the **LGBTQ community** in cases of **non-consensual unnatural sex**.
- **Legal Response:** The **Central government** acknowledged the issue but emphasized that **courts cannot compel the legislature** to enact specific legal provisions, reinforcing the **separation of powers** between the **judiciary and the legislature**.
- **Impact on LGBTQ Rights:** Despite the **decriminalization of consensual same-sex relationships in 2018**, the removal of **Section 377-like provisions in BNS** has led to fears of **inadequate protection in non-consensual situations**, potentially undermining **legal safeguards for sexual violence victims**.

Afghan Sikhs' Citizenship under CAA

- **India's Role:** India has **ratified all four Geneva Conventions of 1949**.
- **Afghan Sikhs Granted Citizenship:** 20 Afghan Sikhs recently obtained Indian citizenship under the **Citizenship Amendment Act (CAA), 2019** in New Delhi.
- **Long-Term Visa Holders:** Some applicants had been residing in India on long-term visas since **1997** with pending applications under the **Citizenship Act, 1955**.
- **CAA vs. 1955 Act:** The **CAA 2019** simplified citizenship for six non-Muslim communities from Afghanistan, Bangladesh, and Pakistan, reducing the continuous stay requirement from **11 years to 5 years**.
- **Migrating Applications:** Many Afghan Sikhs seek to shift their applications from the **1955 Act** to the **CAA** for faster approvals.
- **Streamlined Process:** The **CAA** eliminates State government involvement, resulting in quicker decisions compared to the more bureaucratic **1955 Act** process.

The Decline of Kerala's Jewish Communities: A Historical Reflection

Context:

The recent passing of the last **Paradesi Jewish woman in Kerala** marks a significant moment in the history of **Kerala's Jewish community**, which has now nearly disappeared.

Key Points:

- **Dwindling Population:** Once thriving, **Kerala's Jewish community** has nearly gone extinct. India's Jewish population, which peaked at **20,000-50,000 in the 1940s**, is now estimated at **4,000-5,000**, primarily **Marathi-speaking Bene Israel** on the Konkan coast.
- **Jewish Groups in Kerala:** Kerala had two main Jewish communities:
 - **Malabar Jews**, believed to have arrived during the time of **King Solomon**.
 - **Paradesi Jews**, who migrated from the **Iberian Peninsula** during the **15th and 16th centuries**.
- **Distinct Communities:** The **Paradesi Jews**, active in Kerala's **spice trade**, became a distinct group, adopting local customs while separating themselves from the **Malabar Jews**.
- **No Persecution:** Unlike Jewish communities elsewhere, Kerala's Jews faced little persecution and thrived under **Dutch, Hindu, and later British rule**.
- **Migration:** Since the **1950s**, most **Kerala Jews** have migrated to **Israel**, leaving only a small number of **Malabar and Paradesi Jews** in Kerala today.

SC Directs Implementation of NCAHP Act, 2021

Context

- The **Supreme Court** has issued directions to expedite the implementation of the **National Commission for Allied and Healthcare Professions (NCAHP) Act, 2021**, noting delays in its execution.

Supreme Court Directions

- **Union and States:** Must implement the **NCAHP Act** within **2 months**.
- **Health Ministry:** To convene an **online meeting** within **2 weeks** to outline the implementation roadmap.
- **Infrastructure:** All states must set up required infrastructure and make provisions of the Act operational.
- **Compliance Reports:** All states and UTs to submit reports by the next hearing.

Issues Due to Non-Implementation

- **Lack of Uniformity:** In **qualifications** for allied health courses.
- **Patient Safety:** Poorly regulated healthcare training jeopardizes patient care.
- **Unregulated Institutions:** Rise in unregulated institutions offering courses in healthcare.

Key Provisions of NCAHP Act, 2021

- **Recognized Categories:** Specifies recognized categories of **allied and healthcare professions**.
- **National Commission:** Regulates education and practice, creates a **Central Register**, and ensures **uniform exams**.
- **State Councils:** Enforce **professional conduct**, ethics, and oversee **institution establishment**.

Geneva Conventions of 1949: 75 Years of International Humanitarian Law

- **What They Cover:** The **Geneva Conventions** are the foundation of **international humanitarian law**, outlining key rules to limit the horrors of war.
 - Protects:
 - **Wounded and sick soldiers on land.**
 - **Wounded, sick, and shipwrecked military personnel at sea.**
 - **Prisoners of war.**
 - **Civilians**, including those in **occupied territories**.
- **Additional Protocols:**
 - **1977 and 2005** protocols supplement the conventions, enhancing protections.

UN Cybercrime Treaty: A Landmark Step

Context

- The UN's **first treaty to combat cybercrime** more effectively, addressing issues like **child sexual abuse imagery** and **money laundering**.
- Treaty to enter into force once **40 member nations** ratify it.
- The **Budapest Convention (2001)** currently serves as a global guide for cybercrime legislation.

Significance of Treaty

- Establishes a **global cybercrime legal framework**.
- Introduces a **global criminal justice policy** to combat cybercrime.

Key Provisions

- **Domestic Legislation:** Requires states to make it illegal to breach information systems.
- **Child Protection:** Criminalizes the production, sale, and distribution of **child sexual content online**.
- **Human Rights:** Ensures states' obligations align with **international human rights law**.
- **Data Access:** Allows states to **collect data**, compel service providers to hand over **incriminating evidence** for convictions.

Centralised Civil Registration System (CRS) Portal Issues

Current Situation:

- The **CRS portal**, used for registering births and deaths in India, is experiencing significant technical issues, causing widespread disruptions in certificate issuance.

Recent Developments:

- **2023 Registration of Births and Deaths (Amendment) Act:** Mandates that all births and deaths from **1st October 2023** be registered digitally through the CRS portal.
- **Digital Birth Certificates:** Will be used as proof of date of birth for various services.
- **Centralised Database Updates:** Includes updates to the **National Population Register (NPR)**, **ration cards**, **property registration**, and **electoral rolls**.

National Population Register (NPR):

- **Collected:** In 2010 and updated in 2015.
- **Database Size:** Contains information on **119 crore** residents.

Current Implementation:

- **Migration Status:** **23 states** and **six union territories** have transitioned to the new CRS portal.
- **State-Specific Portals:** States like **Tamil Nadu** must send data to the Centre in real-time, as per the 2023 amendment.

Technical Issues:

- **Problems Identified:** Slow performance, frequent error messages, and data syncing issues.
- **Impact:** Delays in the issuance of birth and death certificates.

Implications:

- The technical issues with the CRS portal are impacting the efficiency of civil registration and the update of critical databases, affecting service delivery and administrative processes.

Recent Ruling and Surrogacy Regulations in India

Recent Ruling:

- **Bombay High Court Decision:** Ruled that **sperm or egg donors** do not have legal rights over a child and cannot claim to be the biological parents.

Surrogacy Overview:

- **Definition:** Surrogacy involves a woman (the surrogate) agreeing to carry and give birth to a child for another person or couple (the intended parents).
- **Types:**
 - **Surrogate (Gestational Carrier):** Conception, carrying, and birth of a child for intended parents.

Surrogacy (Regulation) Act, 2021:

- **Eligibility for Surrogacy:**
 - **Widow or Divorcee:** Aged 35-45.
 - **Legally Married Couple:** Married for at least 5 years; must not have previous biological, adopted, or surrogate children.
 - **Age Limits:** Indian man aged 26-55 years and woman aged 25-50 years.
 - **Medical Condition:** Surrogacy allowed only if medically necessary.
- **Regulations:**
 - **Commercial Surrogacy:** Banned; punishable with up to **10 years** in jail and a fine of up to **Rs 10 lakhs**.
 - **Altruistic Surrogacy:** Permitted; no monetary exchange allowed. Surrogate must be genetically related to the intended parents.
 - **Legal Status of Child:** The child is legally recognized as the biological child of the intended couple upon birth.

INTERNATIONAL RELATIONS

UNSC Reforms Essential for Tackling Global Challenges: G4 Nations

Context:

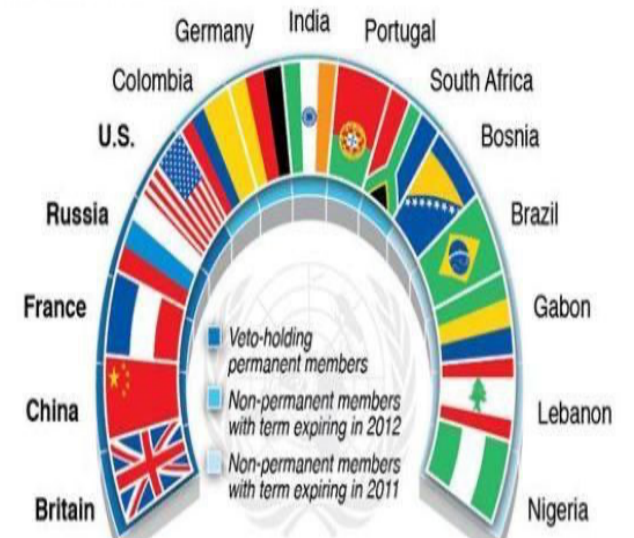
India, representing the G4 Nations (India, Japan, Brazil, Germany), has called for urgent reforms to the United Nations Security Council (UNSC) to effectively address global challenges like extremism and cyber threats.

Key Points:

- **G4 Proposal:**
 - **Membership Expansion:** G4 proposes increasing UNSC membership from 15 to 25, adding six permanent and four non-permanent members.
 - **Representation Gap:** Africa, Latin America, the Caribbean, and Asia Pacific are underrepresented in the permanent member category.
- **Need for Reform:**
 - **Declining Credibility:** UNSC's failure to resolve major conflicts, such as Russia-Ukraine.
 - **Interest-based Veto Usage:** Permanent members, like China, have used veto power to serve national interests, e.g., blocking India's resolutions against global terrorists.
 - **India's Stand:** India seeks a greater role in global decision-making, especially on issues like terrorism and representation of the Global South.
- **Challenges in Reform:**
 - **Amendments:** Reforms require changes to the UN Charter.
 - **Opposition:** The Coffee Club (Italy, Pakistan, etc.) opposes reforms proposed by G4 and the L.69 Group (developing countries).
 - **Slow Progress:** Intergovernmental Negotiations (IGN) on UNSC reforms remain stalled.

U.N. SECURITY COUNCIL

Each Council member has one vote. Decisions need at least nine of the 15 members' votes



About UNSC:

- **Established:** 1945 by the UN Charter.
- **Function:** Maintenance of international peace and security.
- **Members:** 5 permanent (US, China, UK, Russia, France) and 10 non-permanent members (elected for two years).

G4 Nations (Group of Four):

- **Members:** India, Japan, Brazil, Germany.
- **Objective:** The G4 nations are united by their common aspiration to become permanent members of the United Nations Security Council (UNSC).



India's Crucial Visit to Maldives:

Context

- **India's External Affairs Minister (EAM) S. Jaishankar** concluded a significant visit to the **Maldives**, reinforcing its role as an essential partner in **Indian Ocean security**.

Key Outcomes

- **Water & Sewerage Network:** Inauguration of **India's Line of Credit (LoC)** assisted project across **28 islands**.
- **Capacity Building:** MoU signed for training **1,000 Maldivian civil servants** in India.
- **UPI Launch:** Agreement on **introducing UPI** in the Maldives.
- **Community Projects:** Inauguration of **6 High Impact Community Development Projects (HICDPs)** under Indian assistance.
- **Greater Male Connectivity Project (GMCP):** India reaffirmed commitment to this key development initiative.
- **Addu Projects:** Inauguration of **Addu Reclamation, Shore Protection, and Detour Link Bridge Project**.

Significance of the Visit

- **Strategic Partnership:** Strengthened ties despite **political strains** due to Maldivian President **Muizzu's pro-China stance**.
- **Eased Bilateral Tensions:** Signaled a **thaw in relations**, especially after the **India-Out campaign**.
- **Economic Cooperation:** Reinforced **trade, tourism, and development ties**, with India remaining a significant partner in **Maldives' infrastructure and tourism**.
- **Regional Stability:** India's assistance could stabilize the Maldives, similar to its support for **Sri Lanka's economic crisis**.

India-Maldives Relations: Key Aspects

- **Strategic Location:** Maldives' location is vital for India's **maritime security** in the Indian Ocean.
- **Cultural Link:** Historical ties through **Buddhism** and shared cultural heritage.
- **Essential Supplies:** India provides crucial **food, medicines, and building materials**.
- **Tourism Dominance:** **Indian tourists** are a major market for Maldives' economy.
- **Security Provider:** **India** has consistently provided **military and disaster assistance** to the Maldives, including **joint exercises**.

Challenges

- **India-Out Campaign:** Perception of **Indian interference** led to **withdrawal of military personnel**.
- **Tourism Strain:** Diplomatic tensions sparked a **boycott Maldives trend** on social media.
- **China's Influence:** Rising **Chinese presence** poses a strategic challenge for India.

AUKUS Members Sign Naval Nuclear Propulsion Agreement

Key Highlights

- **Agreement:** Enables the transfer of **Virginia-class nuclear submarines** from the **US to Australia** and equipment from the **UK** for future **SSN-AUKUS submarines**.
- **Restrictions:** Prevents **uranium enrichment or reprocessing** in Australia, ensuring compliance with **non-proliferation obligations**.
- **Nuclear Waste:** Australia will manage nuclear waste generated by its submarines.

About AUKUS

- **Trilateral Security Partnership:** Formed in **2021** between **Australia, the US, and the UK** to strengthen security in the **Indo-Pacific**.
- **Pillar 1:** Supports Australia in acquiring **conventionally armed, SSN submarines**.
- **Pillar 2:** Focuses on **cooperation in advanced military capabilities**, including **AI, quantum technologies, cyber, hypersonic, and electronic warfare**.

Impact on Indo-Pacific

- **Balance of Power:** Counters **Chinese influence** and redefines the region's **security architecture**.
- **India's Strategic Autonomy:** Aligns with India's strategic interests and complements the **Quad**.
- **Nuclear Proliferation Concerns:** Raises implications regarding the **exchange of nuclear materials and technology**.

6th India-Australia Maritime Security Dialogue Concluded

Context: The 6th India-Australia Maritime Security Dialogue focused on maritime domain awareness, Humanitarian Assistance and Disaster Relief (HADR) coordination, and other security issues. Concurrently, the 14th meeting of the India-Australia Joint Working Group on Counter-Terrorism was held. These engagements strengthen the India-Australia Comprehensive Strategic Partnership (CSP).

About India-Australia CSP:

- **Upgrade in Relations:** Elevated from Strategic Partnership (2009) to Comprehensive Strategic Partnership (CSP) in 2020.
- **Core Values:** Based on mutual understanding, trust, and shared values like democracy and the rule of law.

Key Aspects of CSP for India:

1. Maritime Cooperation:

- Australia supports India's Indo-Pacific Oceans Initiative (IPOI) and launched the Australia-India Indo-Pacific Oceans Initiative Partnership (AIPOIP) to ensure an open and inclusive Indo-Pacific region.

2. Economic Cooperation:

- Economic Cooperation and Trade Agreement (ECTA) came into force in 2022, potentially creating 10 lakh jobs in India.

3. Defence Cooperation:

- Mutual Logistics Support Arrangement (MLSA) signed for enhanced military collaboration.
- Conducts joint military exercises like AUSTRAHIND.

4. Regional and Multilateral Cooperation:

- Collaborates in platforms like G-20, WTO, IOR-ARC, ASEAN Regional Forum, and QUAD.
- Australia supports the Comprehensive Convention on International Terrorism (CCIT) at the UN General Assembly.

India-Nepal Sign MoU for Munal Satellite Launch

Context

- **India and Nepal** signed an MoU to provide grant assistance for the launch of Nepal's Munal Satellite, using NSIL's Polar Satellite Launch Vehicle.

Key Details

- **Munal Satellite:** An indigenous satellite developed by Nepal to create a vegetation density database of Earth's surface.
- **Space Diplomacy:** Leverages space science and technology for foreign policy goals and to boost national space capabilities.

Significance of Space Diplomacy for India

- **Global South Cooperation:** India promotes common space tech, e.g., South Asia Satellite Project.
- **National Security:** India-US space situational awareness agreement enhances space asset safety.
- **International Cooperation:** Capacity building for space resources, e.g., UNNATI program by ISRO.
- **Conflict-Free Space:** India's commitment to peaceful use of outer space.

Challenges

- **Lack of private participation,** limited deep space exploration missions, and lack of multilateral space partnerships.

India's International Space Cooperation

- **India-US:** Joined Artemis Accord, NISAR satellite collaboration.
- **India-EU:** Earth observation data sharing agreement.
- **India-Russia:** Partnership in human spaceflight program.

SOCIAL ISSUES

25th Edition of "Women and Men in India 2023" Report Released

Context

The **Ministry of Statistics and Programme Implementation** released the **25th edition of the "Women and Men in India 2023" report**, which provides a comprehensive overview of gender-related trends in the country. It highlights key data on **population growth, fertility, labor force participation, and entrepreneurship**. The report also addresses challenges such as the **skewed sex ratio, aging population, and low female labor force participation**, offering insights into gender dynamics and future projections.

Key Highlights

- **Population Growth:** By **2036**, India's population is projected to reach **152.2 crore**, with an improved **sex ratio of 952 women per 1000 men**.
- **Age Demography:** Decline in individuals under **15 years** and an increase in the **60+ age group** expected by 2036.
- **Fertility Trends:** **Age Specific Fertility Rate (ASFR)** has decreased for younger women but increased slightly in the **35-39** age group.
- **Labour Force Participation Rate (LFPR):** Female LFPR increased from **23.3% to 37%** (2017-2023), while male LFPR saw a slight rise.
- **Women Entrepreneurship:** **47.6%** of start-ups recognized between 2016 and 2023 were led by women.

Challenges

- **Skewed Sex Ratio:** Persistent son preference continues to skew the sex ratio.
- **Aging Population:** The elderly population is rapidly growing, with an expected **347 million** seniors by 2050.
- **Low Women LFPR:** Traditional gender roles limit women's participation in the workforce.
- **Informal Women Entrepreneurship:** Many women-led enterprises lack formal funding and security benefits.

Way Forward

- **Balanced Sex Ratio:** Enforce strict measures to prevent gender-based abortions.
- **Aging Population:** Focus on senior healthcare and boost the **silver economy**.
- **Boosting Women LFPR:** Provide childcare subsidies to support working mothers.
- **Supporting Women Entrepreneurship:** Formalize women-led enterprises and improve access to institutional finance.

Income Gap for Dalit Entrepreneurs: Key Study Insights

- **Study Overview:** Indian Institute of Management Bangalore's study highlights significant income gaps for Dalit business owners compared to other marginalized groups.
- **Income Disparity:** Dalits earn **16% less** than OBCs, STs, and Muslims, despite similar education and resources.
- **Institutional Stigma:** Unique **stigma-related disadvantages** limit Dalits' access to opportunities, affecting their income.
- **Social Capital:** Dalits benefit **6% less** from social networks compared to other groups, whose income rises by **17.3%** with increased social capital.
- **Education Impact:** Education helps but doesn't fully mitigate income disparities caused by stigma.
- **Policy Implications:** Need for **fair economic systems** and **targeted interventions** to address stigma and support Dalit entrepreneurs.

Who are Dalits?

- **Definition:** Dalits, historically "untouchables," make up **16.6%** of India's population and face systemic discrimination.
- **Challenges:** Issues include **social exclusion, economic exploitation, and political marginalization**.

Way Forward:

- **Model Adoption:** Consider **Black Capitalism** practices from the US.
- **Support Networks:** Enhance **financial support** and **network access** for Dalit businesses.
- **Discrimination:** Implement policies to address **caste-based discrimination** and promote **equitable treatment**.

ECONOMY

World Biofuel Day 2024

Why in News?

- **Observed on 10th August 2024** to raise awareness about biofuels as sustainable alternatives and highlight related government initiatives.
- Commemorates **Sir Rudolf Diesel's** successful operation of an engine using peanut oil on 9th August 1893.

What are Biofuels?

- **Biofuels:** Derived from plant biomass or animal waste, commonly from corn, sugarcane, and cow dung.
- **Types:**
 - **Ethanol:** Made from fermentation of crop residues (corn, sugarcane) and blended with petroleum.
 - **Biodiesel:** Made from used cooking oil, animal fats, and grease.

Significance of Biofuels

- **Environmental Benefits:** Reduce greenhouse gas emissions and resource depletion.
- **Energy Security:** Help reduce India's reliance on oil imports (currently over 85%).
- **Economic Impact:** Cut import bills, boost farm incomes, and address surplus crop production.

Government Initiatives

- **National Policy on Biofuel (2018):** Promotes fuel blending and reduces import dependence. Target: **20% ethanol blending by 2025-26.**
- **Pradhan Mantri JI-VAN Yojana:** Supports second-generation ethanol production.
- **GOBAR DHAN Scheme:** Converts cattle dung and waste to biogas and bio-CNG.
- **Global Biofuels Alliance (GBA):** Promotes international cooperation on biofuels.

Challenges Related to Biofuels

- **Environmental Impact:** Biofuel production strains land and water resources; ethanol requires **2,860 liters of water per liter of ethanol.**
- **Food vs. Fuel Dilemma:** Concerns about balancing food security with energy needs.
- **Conversion Efficiency:** Varies based on feedstock and production processes.
- **Infrastructure:** Requires robust infrastructure for production and distribution.
- **Vehicle Compatibility:** Ethanol-blended fuels require engine modifications.

Way Forward

- **Production Boost:** Expand non-food feedstock, modernize facilities, and establish local distilleries.
- **Policy Support:** Increase ethanol blending targets, ensure market stability, and invest in R&D.
- **Technological Improvements:** Improve storage and transport infrastructure, and ensure vehicle compatibility.
- **Public Awareness:** Launch campaigns to educate consumers and promote adoption of ethanol-blended fuels.

Omkareshwar Floating Solar Project

- **SJVN Green Energy Limited (SGEL)** commissioned a **90 MW Omkareshwar Floating Solar Project.**
- **SJVN Limited:** A Mini Ratna Schedule 'A' CPSU under the **Ministry of Power, Government of India.**

Omkareshwar Floating Solar Project Highlights

- **Location:** Omkareshwar Floating Solar Park on **Narmada River, Khandwa, Madhya Pradesh.**
- **Largest Floating Solar Park in India.**
- **Environmental Impact:** Reduces **2.3 lakh tons of CO2** annually and aids in **water conservation** by reducing evaporation.

India's Renewable Energy Growth

- **Solar Capacity: 85.47 GW** as of June 2024.
- **Total Renewable Capacity: 195.01 GW** (May 2024), includes:
 - **Wind Power:** 46.65 GW
 - **Biomass/Cogeneration:** 10.35 GW
 - **Small Hydropower:** 5 GW
 - **Waste-to-Energy:** 0.59 GW
 - **Large Hydropower:** 46.92 GW

Banking Laws (Amendment) Bill, 2024

Context

- The **Banking Laws (Amendment) Bill, 2024** was introduced in the **Lok Sabha** to enhance governance, protect depositors, and improve accountability in the banking sector.

Objective of the Bill

- Strengthen **banking governance**.
- Improve **reporting consistency** to the **RBI**.
- Enhance **audit quality** in **Public Sector Banks**.
- Extend the **tenure of directors** in **cooperative banks** (excluding chairperson and whole-time directors).

Key Provisions

- **Nominee Option:** Allows up to **four nominees** for bank accounts and lockers.
- **Simultaneous and Successive Nominations:** Includes provisions for both.
- **Substantial Shareholding:** Raises threshold from **Rs 5 lakh** to **Rs 2 crore** for directorship.
- **Cooperative Banks:** Extends directors' tenure from **8 to 10 years**.
- **Transfer to IEPF:** Unclaimed dividends, shares, and bonds go to the **Investor Education and Protection Fund (IEPF)**, claimable later.
- **Amendments to Laws:** Changes to **RBI Act, Banking Regulation Act, SBI Act, and Banking Companies Act** of 1970/1980.

Banking Sector in India

- **137 scheduled commercial banks**, cooperative and local area banks, and **9,516 NBFCs**.
- **99.97% rural banking coverage** through correspondents and outlets.

Banking Landscape Governance

- **Banking Regulation Act, 1949** governs the banking sector.
- **Scheduled Commercial Banks (SCBs):** Listed in the **Second Schedule of the RBI Act, 1934**, must maintain **₹5 lakh** capital and prioritize depositor welfare.
- **Public Sector Banks:** 12 banks under **SBI Act, 1955**, and **Banking Companies Act of 1970/1980**.
- **Private Banks:** Licensed under **Banking Regulation Act, 1949**.
- **Foreign Banks:** Operate in India under **RBI regulations**.
- **Regional Rural Banks (RRBs):** Provide credit for rural and agricultural sectors.
- **Small Finance Banks:** Focus on **financial inclusion**.
- **Payment Banks:** Provide **payment and remittance services**, restricted to demand deposits.

Government to Boost Coal Production through Global Mining Operators

Context:

The **Union Ministry of Coal** has initiated engagement with **Global Mining Developers cum Operators (MDOs)** to enhance efficiency in coal mining projects under **Coal India Limited**.

Key Points:

- **Global Involvement:** MDOs will bring **advanced technology**, handle **land acquisition, rehabilitation and resettlement (R&R)**, and manage **environmental clearances**.
- **FDI Support:** In 2019, **100% FDI** under the **automatic route** was allowed for **coal mining** and associated infrastructure, in compliance with laws like the **Coal Mines (Special Provisions) Act, 2015** and the **Mines and Minerals (Development and Regulation) Act, 1957**.
- **Environmental Compliance:** MDOs will ensure **strict adherence to environmental standards** in collaboration with **pollution control boards**.

Additional Coal Sector Reforms:

- **Composite Licensing:** Introduced **Prospecting Licence-cum-Mining Lease (PL-cum-ML)** under the **MMDR Amendment Act, 2021**.
- **Commercial Coal Mining:** Private players allowed into **coal mining** through **commercial auctions** since 2020.
- **Further Initiatives:** Focus on **Coal Gasification** and the **Integrated Coal Logistic Policy**.

Nagaland's DRTPS Initiative

Context

- **Nagaland** became the first Indian state to adopt the **Disaster Risk Transfer Parametric Insurance Solution (DRTPS)** by signing an MoU with **SBI General Insurance**.

Key Details

- **Objective:** Protect **critical infrastructure** and reduce **economic losses** from extreme weather events over three years (2024-2027).
- **Parametric Insurance:** Provides **predefined payouts** based on specific events, ensuring **quick financial support** after disasters.

Significance

- Enhances **Nagaland's resilience** against extreme weather events.
- Ensures **rapid recovery** and reduces economic losses, setting a benchmark for **disaster risk management** in India.

NITI Aayog & KPMG Report on Pradhan Mantri Mudra Yojana (PMMY)

Key Findings

- **Overall Performance:** Since 2015, **35 crore Micro and Small entrepreneur accounts** have received credit support.
- **Financial Inclusion:** Women hold **71% of accounts** (FY 2022), with increased sanctions for **new entrepreneurs**.
- **Encourages Small Businesses:** **80% of loans** fall under the **Shishu category** (up to ₹50,000).
- **Regional Variation:** The **Northeast region** sees the **lowest and decreasing** number of accounts and sanctions.

Challenges

- **Scheme Design:**
 - **No collateral** leads to **NPA concerns** for banks.
 - **High refinancing rates** and a **15% ceiling** on payouts under **CGFMU** restrict benefits to banks.
- **Institutional Mechanism:**
 - **Poor credit penetration** to weaker sections and remote areas.
 - **Lack of centralized database** for customer information.

Recommendations

- **Portal for real-time data upload** of beneficiaries.
- Increase **digitization** (e.g., **Chatbots** for query redressal).
- **Recognition mechanism** for Micro Lending Institutions (MLIs) based on performance.



- › **Age**
Minimum 18 years & Maximum 65 years
- › **Loan Amount**
Maximum up to Rs. 10 lakh
- › **Eligible Entities**
Individuals, Startups, Artisans, Small Vendors, Shopkeepers, Retailers, Manufacturers & MSMEs
- › **Indian Citizen with No Criminal Records**
- › **Eligible Enterprises**
Pvt. & Public Ltd. Companies, Sole Proprietorship, Partnerships, LLPs, NGOs, Trusts & Co-operative Societies
- › **Availed By**
All Non-Farm Enterprises - Engaged in only Trading, Services and Manufacturing sectors
- › **Applicants**
With No previous Defaults with any bank



CSR Expenditure in India: Uneven Spending Raises Concerns

Why in News?

Recent government data shows that **education** received the highest share of CSR expenditure in FY23 with **Rs 10,085 crore**, sparking debates over **uneven spending** across sectors and regions.

Key Developments in CSR Expenditure

- **Increase in Spending:** Total CSR expenditure rose from **Rs 26,579 crore in FY22** to **Rs 29,987 crore in FY23**.
- **Sector Allocation:**
 - **Education:** Received one-third of the total CSR spend.
 - **Vocational Skills:** Slight increase to **Rs 1,164 crore**.
 - **Animal Welfare:** Significant rise from **Rs 17 crore** in FY15 to **Rs 315 crore** in FY23.
 - **Technology Incubators:** Received the lowest at **Rs 1 crore**.
- **Regional Imbalance:** Maharashtra, Karnataka, and Gujarat received the most CSR funds, while **Northeast** states, **Lakshadweep**, and **Leh-Ladakh** saw the least.

What is CSR?

- **Definition:** CSR is a self-regulating business model where companies are **socially accountable** for their impact on the environment and society.
- **India's Mandate:** India is the **first country** to mandate CSR spending under the **Companies Act, 2013**. Companies meeting specific criteria must spend at least **2% of their net profits** on CSR activities.



Issues in CSR Compliance

- **Geographical Disparity:** CSR spending is concentrated in industrial states, leading to **regional imbalances**.
- **Sectoral Focus:** Majority of CSR funds focus on education, health, and rural poverty, leaving sectors like **livelihood enhancement** underfunded.
- **PSU vs Non-PSU Disparity:** Non-PSUs contribute **84%** of CSR spending, while PSUs contribute **16%**.
- **Transparency Issues:** Lack of clarity in reporting, fund utilization, and impact assessments by implementing agencies.

Ways to Improve CSR Effectiveness

- **Address Disparities:** Invest in **less-funded regions** and sectors like **skill development** and **livelihood enhancement**.
- **Engage Locally:** Align CSR efforts with **local government programs** and collaborate with NGOs for better implementation.
- **Promote Transparency:** Establish **SOPs**, conduct regular reviews, and improve fund utilization oversight.

India's Need for Chinese Technicians and Manufacturing Impact

Context

- India launched a portal to expedite **business visas** for Chinese technicians, crucial for sectors under the **Production Linked Incentive (PLI)** scheme.

Key Facts

1. Why India Needs Chinese Technicians

- Operational Delays:** Machine installation, repair, and training delayed due to visa issues.
- Cost Efficiency:** Chinese technicians are cheaper than Western or Southeast Asian counterparts.
- Global Losses:** Post-2020 tensions caused **\$15 billion in production losses** and **100,000 job losses**.
- Boosting Atmanirbhar Bharat:** Ensures machine operationalization and reduces import reliance.

2. Visa Hesitations Post-Galwan Clash

- Security Concerns:** Visas for Chinese nationals reduced significantly since 2020.
- FDI Policy: Press Note 3, 2020** restricted investments from land-bordering countries.

3. Leveraging China's Expertise

- FDI Inflows:** Encouraging Chinese investment can enhance **exports**.
- China Plus One Strategy:** India can benefit from companies diversifying from China due to competitive labor and market size.
- Global Supply Chains:** India needs to integrate further into global manufacturing chains like China.

4. Challenges in Indian Workforce

- Productivity Issues:** Chinese workers produce more with the same resources.
- Skill Gaps:** Indian industries struggle without Chinese technician assistance.
- Training Deficit:** Poor industrial training and outdated educational curricula.

5. Improving Skill Development

- Foreign Knowledge Transfer:** Learn from **East Asia's** focus on reverse-engineering foreign tech.
- Continuous Training:** Regular employee training for new technologies.
- Educational Reform:** Upgrade education as per **National Education Policy 2020** to enhance future workforce capabilities.

6. PLI Scheme Overview

- Launched:** March 2020.
- Objective:** Increase domestic manufacturing, reduce imports, generate employment.
- Initial Sectors:** Mobile manufacturing, medical devices, electrical components.
- Now Extended to 14 Sectors:** Including **automobiles, pharmaceuticals, telecom, drones, solar PV modules, and textiles**.



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Production Linked Incentive Scheme (PLI) for Large Scale Electronics Manufacturing

- Incentive:** 4% to 6% on incremental sales (over base year) of goods manufactured in India
- Target Segments:** Mobile phones and specified electronic components
- Eligibility:** Subject to thresholds of incremental investment and incremental sales of manufactured goods
- Tenure of the Scheme:** Five years subsequent to the base year as defined (FY19-20)

RBI Introduces Continuous Clearing of Cheques

Context

- RBI has announced the implementation of **Continuous Clearing of Cheques** under the **Cheque Truncation System (CTS)** to speed up the clearing process.

Key Changes

- Current **CTS** takes up to **two working days** to clear cheques.
- The new system will enable **cheques to be scanned, presented, and cleared within hours** during business hours.
- Aims to **improve efficiency, reduce settlement risk, and enhance customer experience**.

Clean Plant Programme (CPP)

Context

- The **Union Cabinet** has approved the **Clean Plant Programme (CPP)**, aimed at enhancing India's horticulture sector.

Key Features

- Objective:** Improve the **quality and productivity of fruit crops** by providing **virus-free, high-quality planting material**.
- Clean Plant Centers (CPCs):** Establishment of **nine state-of-the-art CPCs** across India to produce and maintain clean planting materials.
- Certification & Legal Framework:** Introduces a **robust framework**



**GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
AND FARMERS WELFARE**

Cabinet Approves Ambitious 'Clean Plant Programme (CPP)' to Revolutionize Horticulture Sector in India

- Setting new standards for excellence & sustainability with a substantial investment of **₹1,765.67 Crores** towards this initiative
- 9 world class state-of-the-art Clean Plant Centres (CPCs)** to be established across India in the ICAR's Institutes
- A Robust **Certification System** will be Implemented ensuring thorough accountability and traceability in planting material production and sale
- Support will be provided to large-scale nurseries for the development of **Infrastructure**
- Implemented by the **National Horticulture Board** in association with **Indian Council of Agricultural Research (ICAR)**

ensuring **accountability and traceability** in planting material production.

- Benefits:**
 - Boosts farmers' incomes.**
 - Improves the quality of **consumer produce.**
 - Increases fruit exports.**
 - Promotes **sustainable agricultural practices.**
- Women Farmers:** Engages women farmers and addresses diverse **agro-climatic conditions.**
- Oversight:** Implementation by **National Horticulture Board** and **ICAR.**

Impact: The CPP will revolutionize India's horticulture by ensuring **high-quality, disease-free planting material**, boosting productivity, and supporting **sustainable agriculture.**

RBI Urges Banks to Boost Deposit Growth Amid Liquidity Concerns

Context

- The **RBI Governor** has urged banks to develop **innovative products** to increase deposit growth, as credit demand outpaces deposits, raising liquidity risks.
- RBI** also tightened liquidity norms for **Housing Finance Companies (HFCs)**, aligning them with **NBFC regulations** to enhance financial stability.

Concerns About Deposit Growth

- Credit-Deposit Ratio:** Reached its highest in 20 years; **deposits grew 11.1%**, while **credit grew 17.4%**.
- Short-Term Deposits:** Banks relying on short-term deposits create liquidity risks.

- **Shift to Alternative Investments:** Savers prefer **mutual funds, stocks, and insurance** over bank deposits.
- **Regulatory Requirements:** CRR and SLR reduce available funds for lending.
- **Increased Competition:** Banks face challenges from **equity-linked products**, leading to slower deposit growth.
- **Liquidity Risk:** Banks using **Certificates of Deposit (CDs)** face increased sensitivity to interest rates.

Strategies to Boost Deposit Growth

- **Focus on Core Business:** Expand branch networks, especially in rural areas.
- **Innovative Products:** Offer attractive and flexible deposit products.
- **Incentives:** Provide **higher interest rates** and promotions to attract deposits.
- **Technology:** Use **data analytics** for personalized deposit products; enhance mobile banking.
- **Customer Engagement:** Strengthen customer relationships through **financial literacy programs** and targeted marketing.

RBI's New Liquidity Norms for HFCs

- **Higher Liquid Asset Requirements:** Raised to **15% by 2025**.
- **Credit Rating Requirements:** HFCs must maintain an **investment-grade rating**.
- **Public Deposit Tenure:** Reduced from **10 years to 5 years**.
- **Deposit Limits:** Ceiling on public deposits reduced from **3 times to 1.5 times** of net owned funds.

About Housing Finance Companies (HFCs)

- **HFCs** provide housing loans and were initially regulated by the **NHB**, but regulation transferred to **RBI** in 2019. They are a key source of home loans, often surpassing traditional banks in loan disbursement.

Next Industrial Revolution to be Bio-Economy Driven

Event Highlight:

- **Global Bio-India 2024:** The statement was made during the 4th edition of this event, a strategic initiative by the Department of Biotechnology and Biotechnology Industry Assistance Research Council (BIRAC).

About Bio-Economy:

- **Definition:** The bio-economy involves the knowledge-based production and use of biological resources, processes, and methods to provide goods and services sustainably across all economic sectors.
- **Important Sectors:** Bioindustrial, Biopharma, Bioagriculture, etc.

Bio-Economy Status:

- **Growth:** The bio-economy has expanded from \$10 billion in 2014 to over \$130 billion in 2024.
- **Projection:** Expected to reach \$300 billion by 2030.
- **India's Rank:** India is ranked 12th globally in terms of bio-manufacturing.

Significance of Bio-Economy:

- **Environmental Impact:** Reduces reliance on fossil fuels, decreases greenhouse gas emissions, and promotes sustainability.
- **Circular Economy:** Promotes the circular economy by minimizing waste and maximizing resource efficiency. For example, agricultural waste can be converted into biogas.
- **Economic Contribution:** Contributes 4% to India's GDP and employs over 2 million people.
- **Technological Advancements:** Enhances agricultural productivity, pest resistance, and food security.

Challenges Faced by Bio-Economy Sector:

- **Regulatory Structure:** Uncertain regulatory framework and lack of uniform industry standards.
- **Research and Development:** Insufficient state-of-the-art research centers and R&D funding.
- **Ethical Issues:** Challenges related to Responsible Research and Innovation, such as genetic modification.

Initiatives and Policies:

- **BIRAC's Role:** Nurtures the biotech innovation ecosystem in India with schemes like Biotechnology Ignition Grant Scheme and BioNEST.
- **Policy Measures:** Includes the National Biofuel Policy (2018), National Biopharma Mission, and National Mission on Bioeconomy.
- **BioRRAP:** Launched as a single gateway for regulatory approval for biological research.



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AGRICULTURE

Coffee Production in India: Current Status and Challenges

Recent News:

- The **Coffee Board of India** warns of a potential significant drop in coffee production for 2024-25 due to environmental challenges including **high temperatures, heavy rainfall, and landslides** in major coffee-growing regions.

Current Status:

- India is the **6th largest coffee producer** and **5th largest exporter** globally, contributing **3.14%** of global coffee output.
- 70%** of India's coffee is exported, while **30%** is consumed domestically.
- Production in 2023–24:** Approximately **3.6 lakh metric tonnes** of green coffee.

Coffee Varieties:

- Arabica:** Grown at higher altitudes; valued for its aroma.
- Robusta:** Known for its strength; used in various blends.

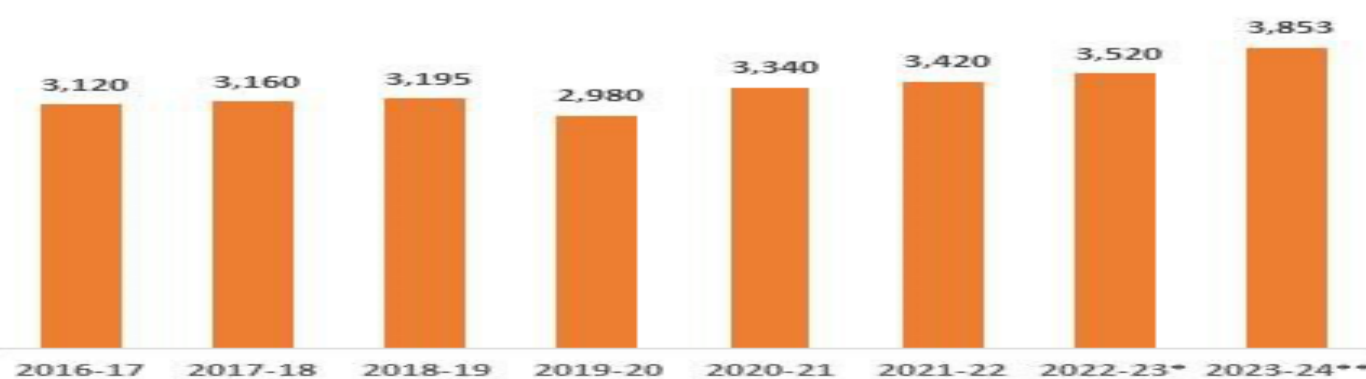
Causes of Declining Output:

- Prolonged drought** and **high temperatures** in April-May caused **scorching** and **fruit burn**.
- Heavy July rainfall** led to **berry dropping, stalk rot, and wet foot conditions**.
- Landslides** in Sakleshpur and Wayanad caused significant **plant and plantation losses**.
- Estimated yield loss: 15% to 20%.**

Key Facts about Coffee Production:

- History:** Introduced in the late 17th century by the Dutch, with commercial cultivation flourishing under British rule in the mid-19th century.
- Ecological Significance:** Grown in the **Western and Eastern Ghats**, contributing to biodiversity and socio-economic development.

India's coffee production trend (lakh tonnes)



Source: Coffee Board of India

Note: *Final Estimate, ** Post Blossom Estimate (Till 27th March)

Climatic Conditions:

- Climate:** Hot and humid, with temperatures between **15°C and 28°C** and rainfall of **150 to 250 cm**.
- Soil:** Ideal soils are **fertile volcanic red earth** or **deep sandy loam**. Heavy clay or sandy soils are inadequate.

Major Coffee Growing Areas:

- Karnataka:** Accounts for **70%** of production.
- Kerala:** Contributes **23%**.
- Expansion in **Andhra Pradesh, Telangana, Odisha, and Northeast states**.

Coffee's Impact on Climate Change:

- Coffee production accounts for **40-80%** of total GHG emissions due to mechanisation, irrigation, and fertilizer use.
- Coffee preparation and capsule use also impact the carbon footprint.

Coffee Board of India:

- Established:** Under the Coffee Act, 1942.
- Functions:** Research, development, market intelligence, and promotion of coffee.
- Headquarters:** Bangalore, with **33 members** including a Chairperson.

109 High-Yielding, Climate Resilient, Biofortified Crops Released

Context

- **109 crop varieties** developed by ICAR under the "Lab to Land" programme, focusing on **climate resilience, high yield, and biofortification**.

Key Crop Improvement Strategies

- **Genomics-assisted selection**
- **Phenomics** (measurement of traits)
- **Conventional breeding & Biotechnology** approaches like genetic engineering and genome editing.

Need for Crop Improvement

- **Climate Resilience:** Crops can withstand adverse weather like **heatwaves and droughts** (e.g., Bt cotton).
- **Food Security:** Projected **16% drop in yields by 2030**; new varieties can mitigate this.
- **Nutritional Security:** **Biofortified crops** linked to schemes like **Mid-Day Meal (PM Poshan)** to combat malnutrition (e.g., **vitamin-A rich maize**).
- **Farmers' Income:** **High-yielding varieties** lead to **increased incomes**.

About Biofortification

- Enhances **nutritional quality** during crop growth (e.g., **iron-rich wheat**), unlike conventional **fortification** done during processing.

Lab to Land Programme: Facilitates the **transfer of agricultural technology** from research institutions to farmers.

Arecanut: Overview and Advisory

The **Central Plantation Crops Research Institute (CPCRI)** has issued an **advisory** to help control '**kole roga**' (**fruit rot disease**) affecting **arecanut plantations**. This disease poses a significant threat to arecanut crops, which are primarily grown in regions like **Karnataka, Kerala, Assam, and Meghalaya**, among others. The advisory focuses on providing effective measures to safeguard the commercial value of this important **cash crop**.

Location: Grown in **Karnataka** (largest producer), **Kerala, Assam, Meghalaya, West Bengal**, and the **Andaman and Nicobar Islands**.

Significance: **Commercial crop** also known as **betelnut or supari**, a key ingredient in **tobacco products**.

Ideal Growing Conditions

- **Altitude:** Up to **1000 m** from mean sea level.
- **Temperature:** Thrives between **4°C and 40°C**.
- **Rainfall:** Requires **750 mm to 4500 mm** of well-distributed rainfall.
- **Soil:** Grows best in **laterite, red loam, and alluvial soils** with a **pH range of 5.2 to 7.0**.

Advisory by CPCRI: Issued to control '**kole roga**' (**fruit rot disease**) in arecanut plantations, which is a significant threat to crop yield.

Nitrogen-Use Efficiency (NUE) in Indian Rice Varieties

Context

- A recent study has revealed **significant variations** in **nitrogen-use efficiency (NUE)** among popular Indian rice varieties.

Key Findings

- Some rice varieties are **five times more efficient** in nitrogen use than others.
- **NUE** refers to the **crop yield** in relation to the amount of **nitrogen** (natural and artificial) available.
- **Higher NUE** doesn't always result in the **highest yields**, which is often prioritized by farmers.

Significance

- Developing rice varieties with **higher NUE** could reduce reliance on **imported fertilizers** and lower **nitrogen-related pollution**.
- The study suggests shifting focus from simply increasing yields, as seen during the **Green Revolution**, to **improving NUE** for better environmental outcomes and fertilizer efficiency.

National Pest Surveillance System (NPSS)

Context:

- **Launch:** Union Government introduced the AI-based National Pest Surveillance System (NPSS).
- **Purpose:** Enhance pest management by connecting farmers with agriculture scientists.

Objectives of NPSS:

1. **Scientific Pest Management:** Reduces reliance on pesticide retailers by promoting a scientific approach.
2. **Accurate Pest Control Advice:** Allows farmers to upload crop photos for expert analysis and tailored advice.
3. **Pesticide Use:** Ensures the correct application of pesticides, aiming to improve crop yields and protect soil health.

Features:

- **AI-Based Analysis:** Utilizes artificial intelligence to analyze images of affected crops.
- **Expert Consultation:** Provides farmers with precise recommendations based on expert analysis.

Benefits:

- **Farmers:** Approximately 14 crore farmers will benefit from improved pest management.
- **Technological Integration:** Part of a broader initiative to integrate technological innovations into agriculture.

Impact:

- **Pesticide Use:** Promotes the correct use of pesticides, potentially reducing overuse and environmental impact.
- **Crop Yields:** Aims to enhance crop productivity through targeted pest control.
- **Soil Health:** Contributes to maintaining soil health by avoiding indiscriminate pesticide use.

GEOGRAPHY

Nankai Trough Megaquake Advisory and Subduction Zones

Context

- Japan issued its first **megaquake advisory** for the **Nankai Trough**, warning of potential **earthquakes** greater than **magnitude 8**.

Nankai Trough

- Located off **Japan's Southwest Pacific Coast**, the **Nankai Trough** is a major **subduction zone** where the **Philippine Sea Plate** is being pushed under the **Eurasian Plate**.
- Historically prone to **large earthquakes** every **100-150 years** (e.g., **1944 Tonankai** and **1946 Nankai**).

Subduction Zones

- **Subduction (Benioff) Zones** form where two tectonic plates converge, with the **denser plate subducting** beneath the lighter one into the **mantle**.
- These zones are hotspots for **earthquakes**, **volcanic activity**, and **tsunamis**.

Potential Impact

- A **megaquake** in the **Nankai Trough** could lead to widespread **damage**, including **tsunamis** along Japan's Pacific coast. **Disaster preparedness** measures are in place to mitigate risks.

Subduction Zone Overview

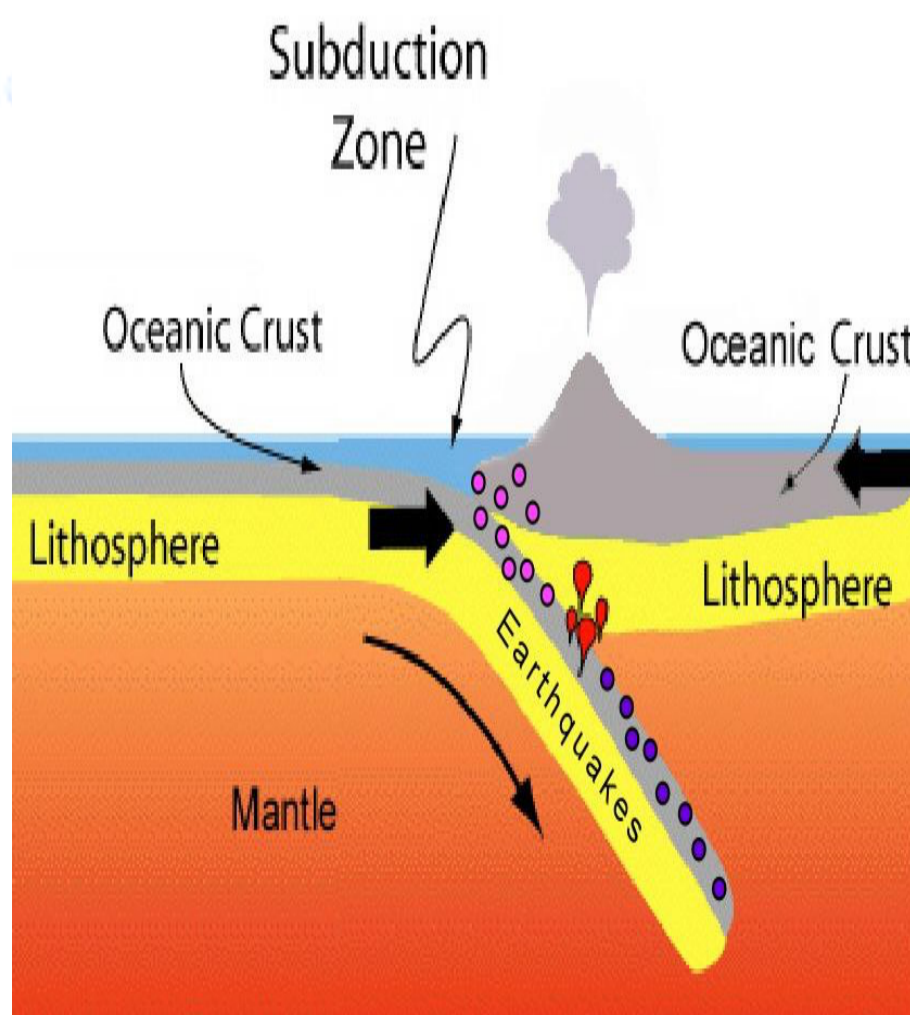
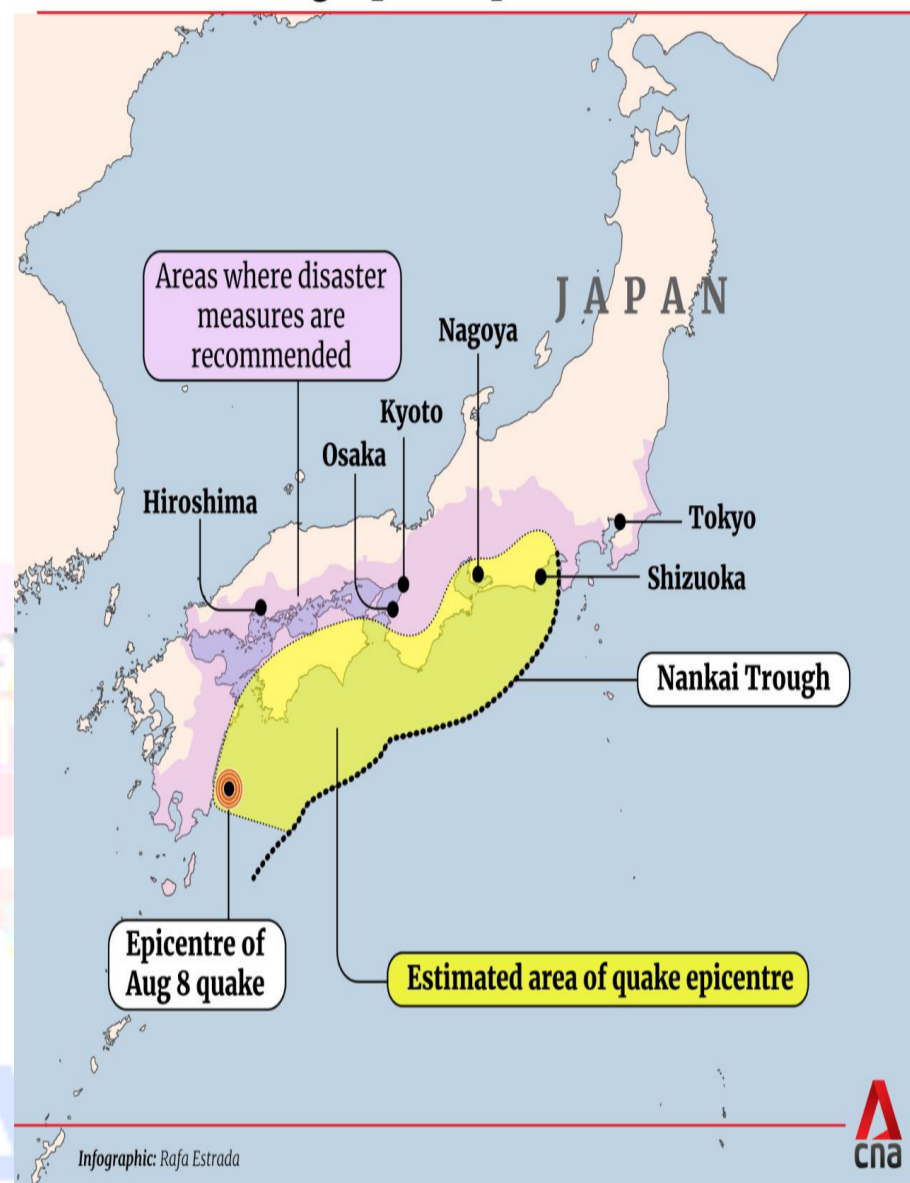
What is a Subduction Zone?

- A **subduction zone** is where two tectonic plates converge, with the **denser plate** sinking beneath the **lighter plate** into the Earth's **mantle**, causing **earthquakes**, **volcanoes**, and **tsunamis**.

How it Works

1. **Plate Convergence:** Plates collide; the denser plate subducts beneath the lighter one.
2. **Subduction:** The sinking plate melts in the mantle, creating **magma**.
3. **Benioff Zone:** The region where the plate begins its descent, often the site of **earthquakes**.

Japan's megaquake warning: Predicted area for Nankai Trough quake epicentre



Types

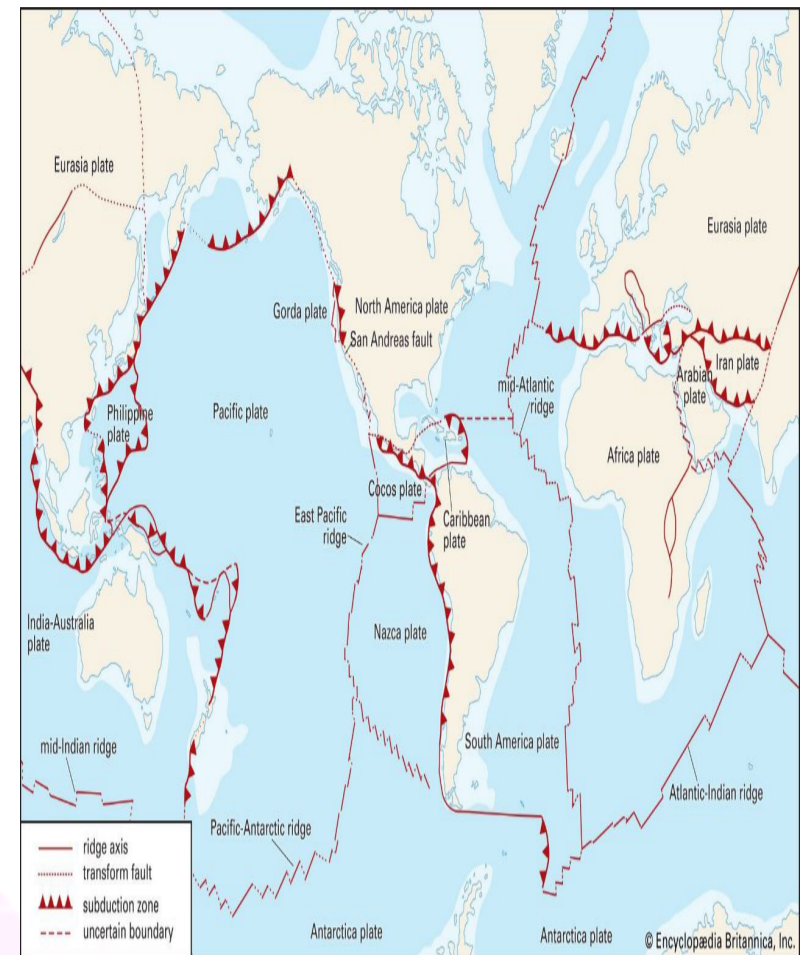
- **Oceanic-Continental:** Oceanic plate subducts beneath a continental plate (e.g., Andes).
- **Oceanic-Oceanic:** One oceanic plate subducts under another (e.g., Mariana Trench).
- **Continental-Continental:** Leads to **mountain formation** (e.g., Himalayas).

Geological Phenomena: Earthquakes, volcanoes, tsunamis, and **mountain building** occur in subduction zones.

Examples

- **Ring of Fire:** Known for seismic activity.
- **Nankai Trough:** A major subduction zone in **Japan** prone to **megaquakes** and tsunamis.

Importance: Disaster Preparedness: Understanding subduction zones aids in predicting and preparing for **natural disasters**.



Antarctica's Deep-Winter Heatwave

Why in News?

- **Antarctica** is facing a **deep-winter heatwave** since July 2024, with temperatures **10°C above normal** and some areas up by **28°C**.

Causes of Heatwaves

- **Polar Vortex Weakening:** Warm air descends as the polar vortex weakens, allowing cold air to escape.
- **Reduced Sea Ice:** Record low sea ice reduces sunlight reflection and exposes warmer waters.
- **Rapid Warming:** Antarctica's **warming rate** is double the global average, driven by **climate change**.
- **Southern Ocean Warming:** Absorbs more heat, worsening the situation and triggering extreme weather.

Consequences

- **Ice Melt Acceleration:** Ice loss has surged **280%** since the 1980s, threatening global sea levels.
- **Sea Level Rise:** Antarctic ice holds **60% of global freshwater**; small increases can displace millions near coasts.
- **Ocean Circulation Disruption:** Melting ice alters salinity, slowing down global ocean circulation, amplifying **global warming**.
- **Ecosystem Damage:** Heat disrupts habitats of species like **polar bears** and **penguins**, impacting biodiversity.
- **Feedback Loops:** Less ice means less sunlight reflection, speeding up ice melt and worsening **climate change**.

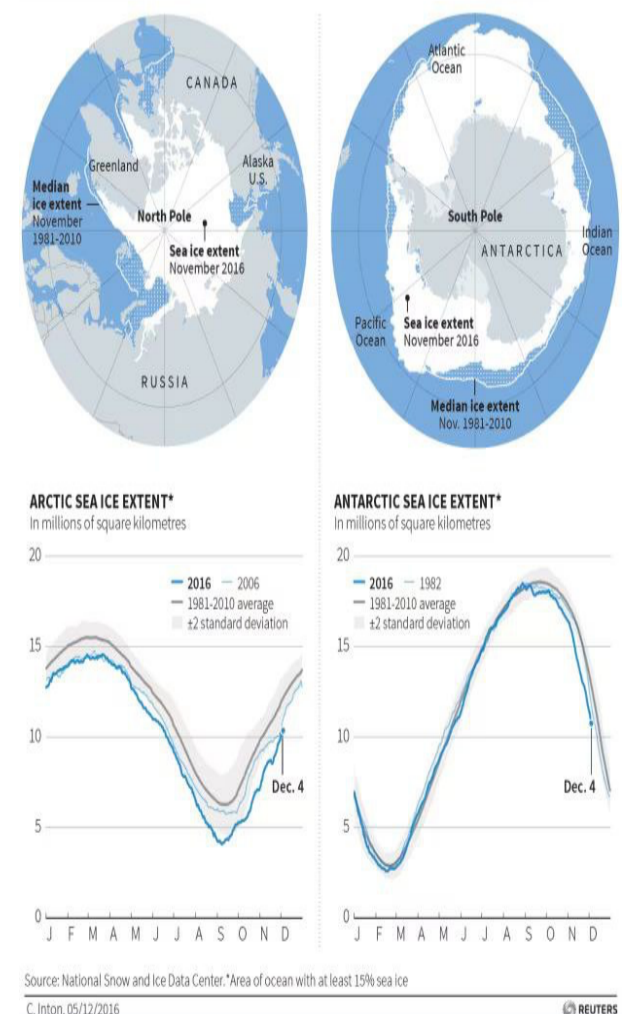
India's Actions in Antarctica

- **Antarctic Treaty**
- **National Centre for Polar and Ocean Research**
- **Indian Antarctic Act, 2022**

Polar heat

Sea ice around Antarctica, now retreating with a summer thaw, is the smallest for December 4 at 11.22 million sq kms, beating the previous 1982 low for the same time of year and 2.06 million below the long-term average.

Sea ice in the Arctic, expanding in the polar winter darkness, is also at record lows for early December at 10.25 million sq kms, below a previous 2006 record and 1.78 million below average.



Source: National Snow and Ice Data Center. *Area of ocean with at least 15% sea ice
C. Inton, 05/12/2016

Tungabhadra Dam Crest Gate Collapse Raises Safety Concerns

Context

- **Tungabhadra Dam's crest gate** collapsed due to **rising water pressure** after heavy rain, sparking fears of **floods and dam safety** in Karnataka.

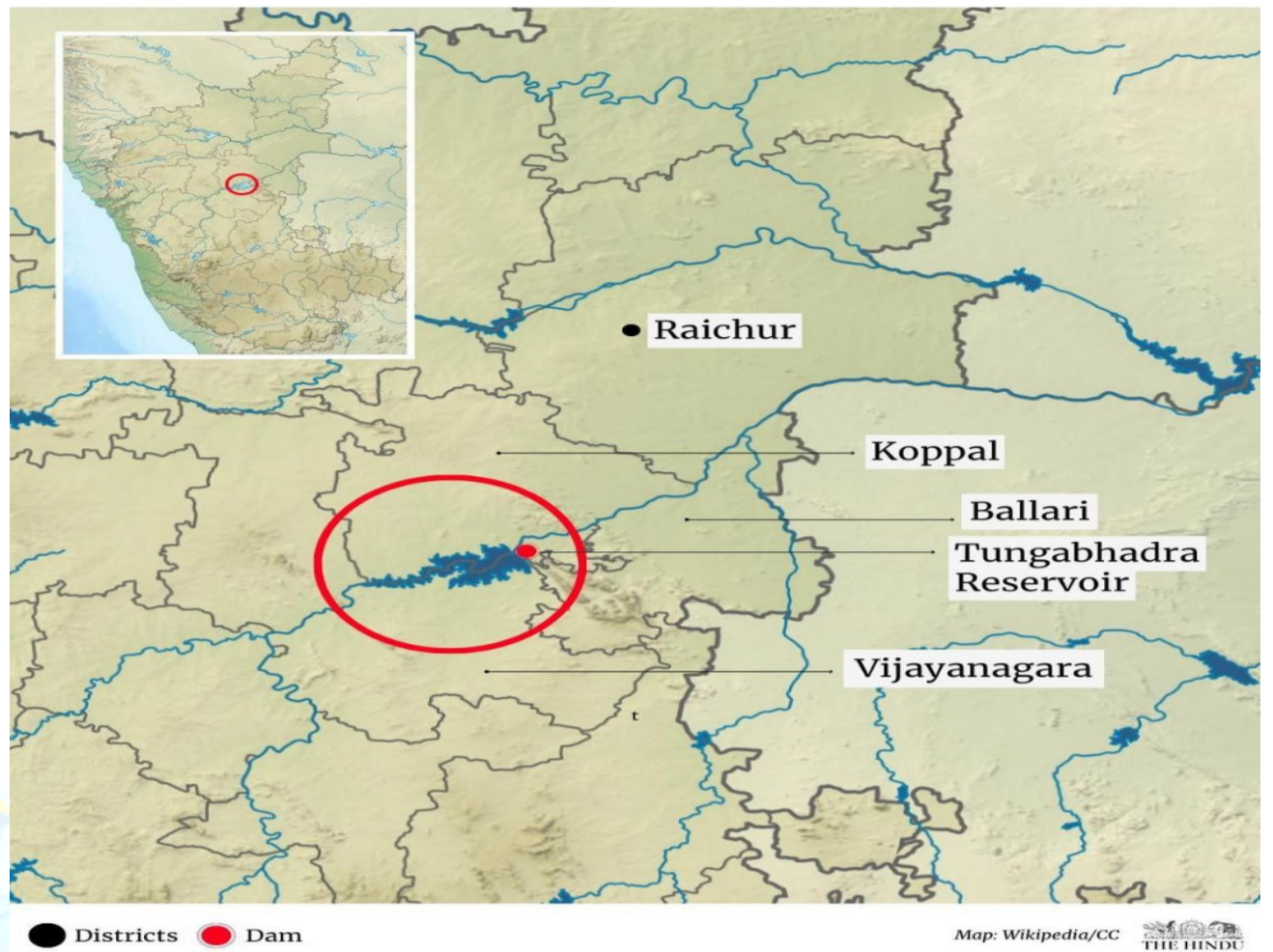
About Tungabhadra Dam

- **Completed:** 1958; built across the **Tungabhadra River** in **Hospet, Karnataka**.
- **Designed by:** M. Visvesvaraya.

Tungabhadra River

- Formed by the confluence of the **Tunga** and **Bhadra** rivers, which originate in the **Western Ghats** and merge near **Shimoga**; it is a **tributary of the Krishna River**.

Tungabhadra Reservoir



Dam Safety Concerns in India

- **Aging Dams:** 80% of India's large dams are over **25 years old**.
- **Seismic Vulnerability:** Example: **Bhuj earthquake (2001)** affected Chang Dam.
- **Flood Risks:** Example: **Chungthang Dam** washed away in **flash floods (2023)**.
- **Other Issues:** **Overtopping, sedimentation, and structural failures**.

Steps Taken for Dam Safety

- **Dam Safety Act (2021)**.
- **Dam Rehabilitation and Improvement Project (DRIP)**.
- **DHARMA:** A web-based tool for dam monitoring.

Dam Failure Examples

- **Machchu Dam** (Gujarat, 1979) and **Tiware Dam** (Maharashtra, 2019).

Perseid Meteor Shower

Context

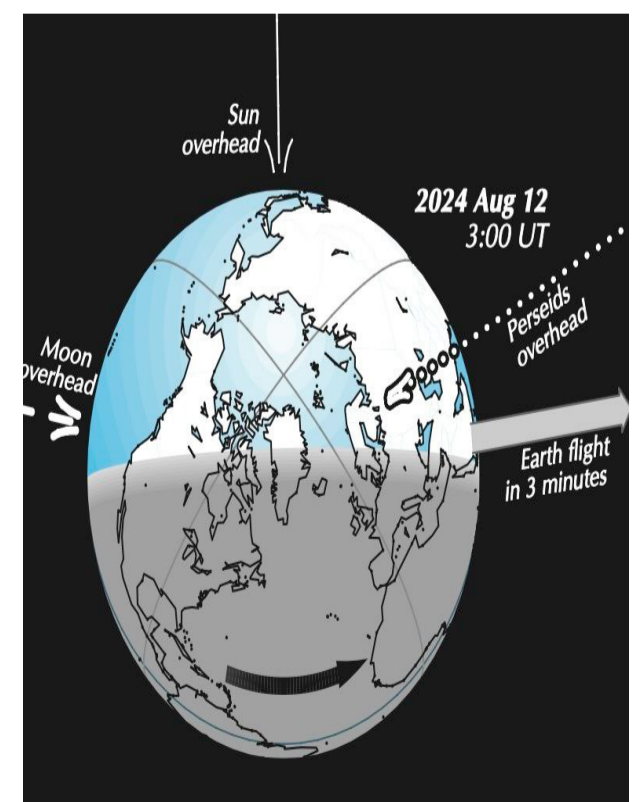
- The **Perseid meteor shower** began in **July** and will continue until **late August**.

Key Details

- **Visible in the northern hemisphere**, it occurs when **Earth passes through debris** from the **comet Swift-Tuttle**.
- The comet orbits the Sun every **133 years**; its debris burns up in Earth's atmosphere, posing **no threat**.
- **Peak visibility:** Over **60 meteors per hour**, though visibility may depend on **local weather** conditions.

Significance

- One of the most **prolific meteor showers**, the **Perseids** are best viewed **mid-July to late August**, with clear skies offering optimal viewing.



History and Culture

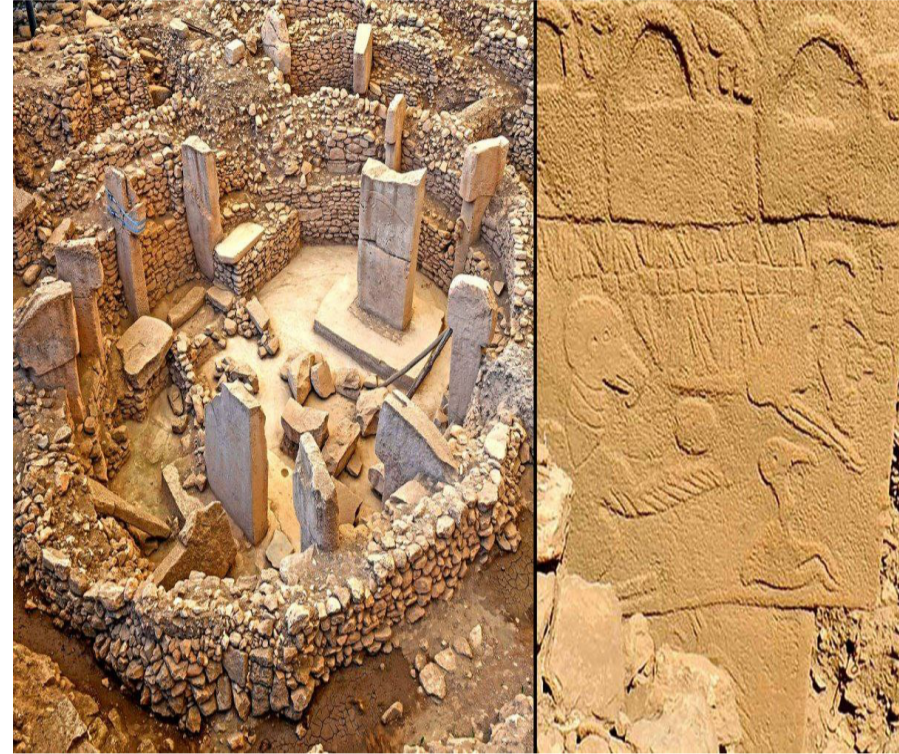
Discovery of Ancient Lunisolar Calendar

Context:

- **Location:** Göbekli Tepe, southern Turkey
- **Findings:** Researchers have identified what may be the **world's oldest lunisolar calendar**.

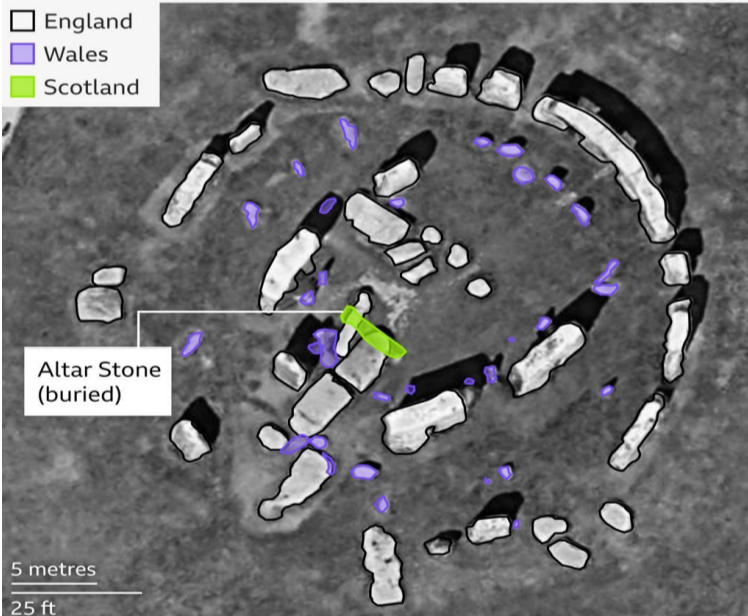
Key Details:

- **Purpose:** The calendar is believed to have tracked the movements of the **moon and sun**.
- **Markings:** **V-shaped carvings** on a stone pillar potentially record a **significant comet strike** around **10,850 B.C.**
 - **Impact:** This comet strike might have caused a **1,200-year ice age**, with catastrophic effects on Earth.
- **Significance:** The carvings suggest that **ancient people** were sophisticated enough to **record astronomical events**, highlighting the importance of these events in their culture.



Stonehenge's Altar Stone Origin

Where the Stonehenge stones come from



Source: English Heritage and Curtin University

Context:

- **Recent Discovery:** Geochemical analysis reveals that Stonehenge's central **Altar Stone** originated from the **Orcadian Basin** in **northern Scotland**, over **800 km** from southern England.

Key Findings:

- **Stone Details:** The Altar Stone is a **six-tonne sandstone slab**.
- **Previous Belief:** It was previously thought to come from **southwest Wales**.
- **Implications:** This new finding suggests that **Stonehenge's construction** involved a broader geographical effort than previously believed.

Significance:

- **Effort and Purpose:** The transportation of the Altar Stone, whether by land or sea, highlights the **significant effort and purpose** behind its movement.
- **Broader Network:** Indicates that Stonehenge was known and valued across a **wider area**, reflecting the **complexity and ingenuity** of Neolithic Britain.



ENVIRONMENT & ECOLOGY

Impact of Climate Change on Earth's Rotation and Its Global Implications

Why in News?

Recent research reveals that **melting polar ice caps** due to **climate change** are causing the **Earth to spin more slowly**, leading to slight changes in the **duration of a day**. This could have significant impacts on **technology dependent** on **precise timekeeping**.

How is Climate Change Affecting Earth's Rotation?

- **Melting Ice Caps:** Water from melting ice flows towards the equator, increasing the Earth's **oblateness** and **moment of inertia**, slowing down Earth's rotation.
- **Slower Spin:** The Earth's rotation has slowed by **1.3 milliseconds per century** due to this phenomenon.
- **Axis Shifts:** Melting ice affects the Earth's **axis of rotation**, causing measurable shifts.

Other Factors Affecting Earth's Rotation Speed

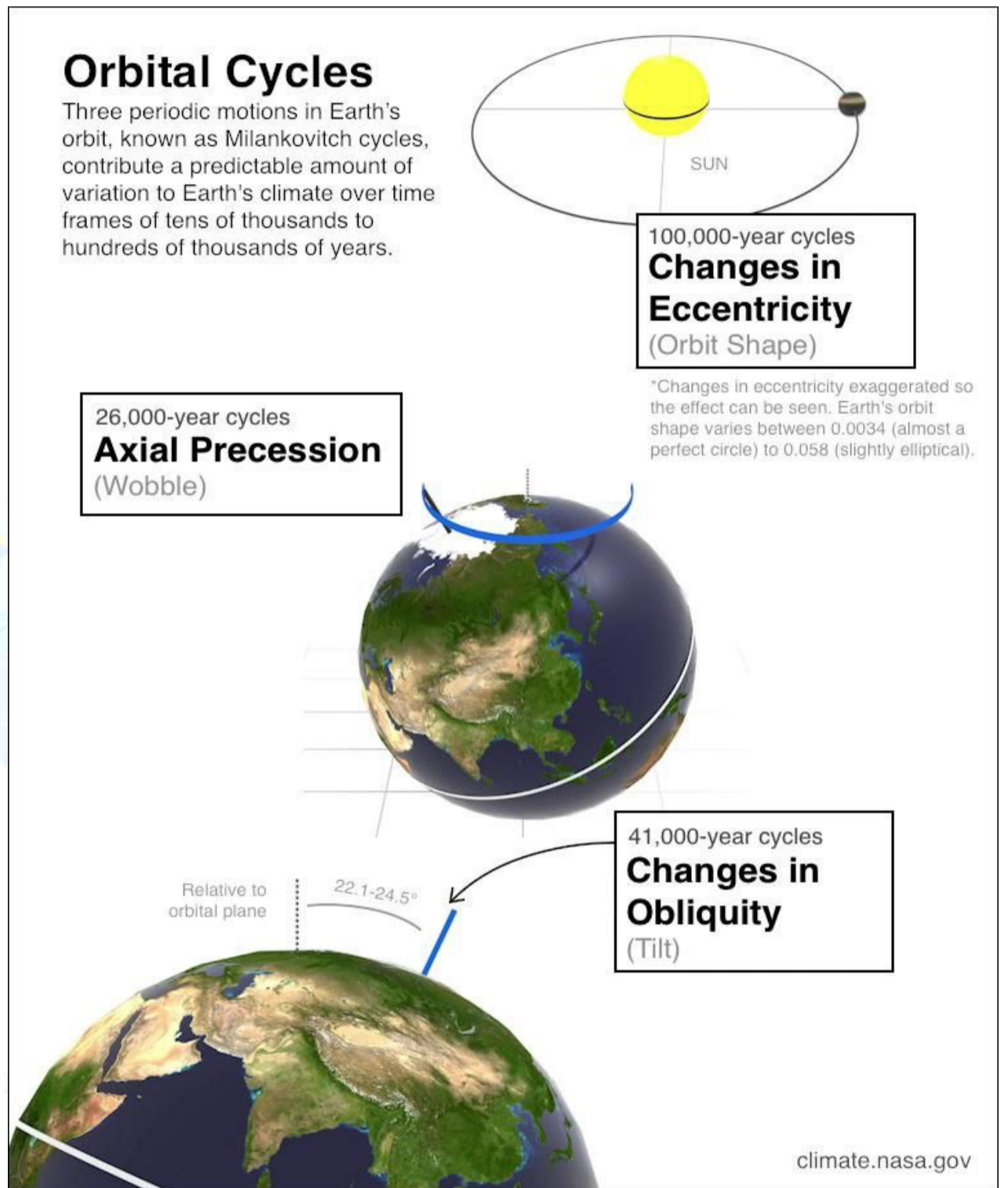
- **Groundwater Depletion:** Alters mass distribution, affecting rotation.
- **Torsional Waves:** Oscillations in the Earth's outer core impact rotation speed.
- **Celestial Bodies:** The Moon's tidal forces contribute to Earth's gradual rotational slowing.
- **Earth's Interior Dynamics:** Movements in the mantle and core influence rotational speed.

Implications of Slower Earth Rotation

- **Leap Seconds:** May need to adjust atomic clocks, potentially disrupting **technology systems**.
- **GPS Accuracy:** Variations in rotation could affect **GPS** and **navigation systems**.
- **Sea Level Rise:** Slow rotation can impact **ocean currents**, influencing climate and sea levels.
- **Seismic Activity:** Changes in rotation might affect **tectonic activity**.

Earth's Motions and Their Effects

- **Rotation:** Causes **day and night** and affects wind, ocean currents (Coriolis effect), and **time zones**.
- **Revolution:** Creates **seasons, solstices, and equinoxes**.
- **Axial Tilt:** Earth's **23.5° tilt** results in the changing seasons and varying day lengths.



Neelakurinji (*Strobilanthes kunthiana*): IUCN Vulnerable Classification



Overview

- **Neelakurinji** (*Strobilanthes kunthiana*) is now classified as **Vulnerable** on the **IUCN Red List** due to significant habitat loss.
- **Unique Blooming Cycle:** Known for blooming **once every 12 years**, this shrub is **semelparous**, meaning it reproduces only once in its lifetime, leading to mass blooming and fruiting before dying.

Habitat and Distribution

- **Endemic** to the **high-altitude shola grasslands** of southwest India, found at elevations between **1,340-2,600 m**.
- **Major Locations:** Predominantly found in the **Western Ghats**, particularly in the **Nilgiris, Munnar, Palani-Kodaikanal, and Anamalai mountains**. One subpopulation exists in the **Eastern Ghats** (Yercaud, Shevaroy Hills).
- **34 Subpopulations:** 33 in the **Western Ghats** and 1 in the **Eastern Ghats**.

Significance

- Known for imparting **purplish-blue colors** to mountain landscapes during mass blooming, giving it the name **Neelakurinji** (Blue *Strobilanthes*).
- The species is named after the **Kunthi River** in Kerala's **Silent Valley National Park**.

Main Threats

- **Habitat Loss:** About **40%** of its habitat has been lost due to **tea and softwood plantations, urbanization, invasive species, and climate change**.

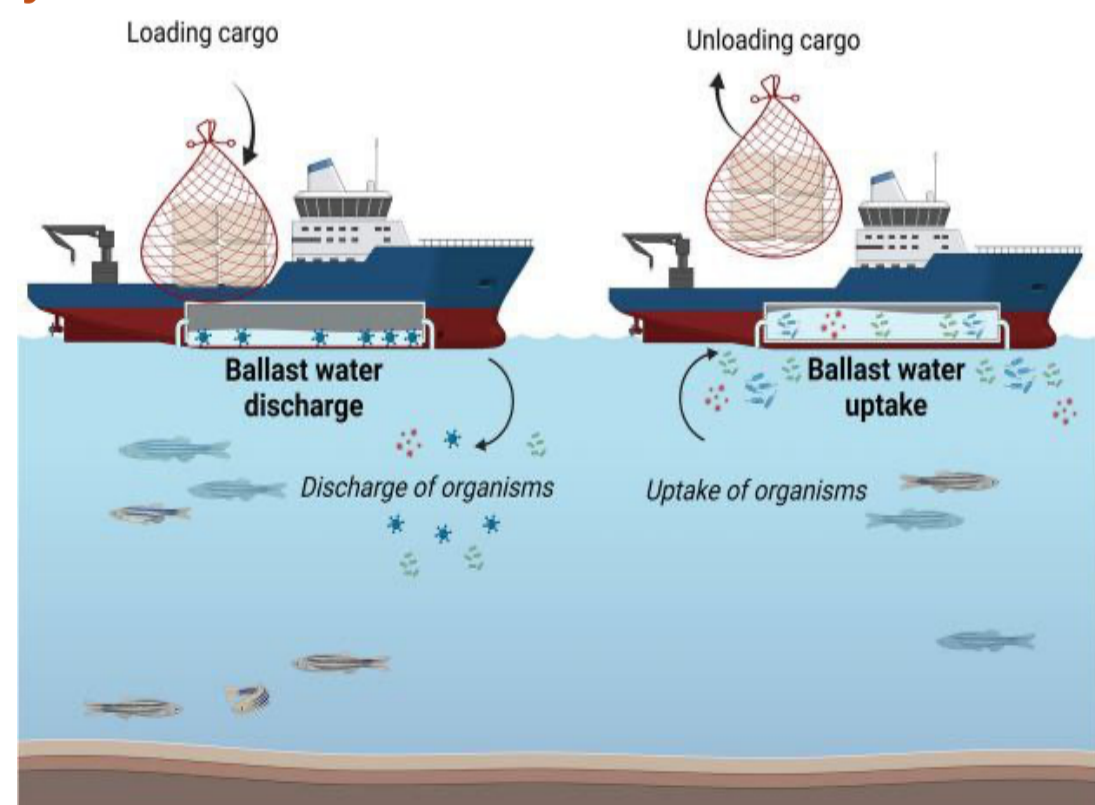
Ballast Water: A Threat to Marine Ecosystems

Context:

Scientists have raised concerns that **ballast water** carried by ships is facilitating the introduction of **exotic and invasive species** in coastal areas, threatening local ecosystems.

About Ballast Water:

- **Definition:** Ballast water is **fresh or saltwater** stored in ships' ballast tanks and cargo holds to provide **stability and maneuverability** during transit.
- **Environmental Impact:** When **untreated ballast water** is released at the ship's destination, it can introduce **invasive marine species**, disrupting local marine ecosystems.



Regulation:

The **International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention)** was adopted in **2004** to regulate the transfer of potentially invasive species through ballast water.

Forever Chemicals: Persistent Environmental and Health Threat



Context:

Researchers in the US have developed methods to trace the origin and destination of **Forever Chemicals**, scientifically known as **Per- and Polyfluoroalkyl Substances (PFAS)**.

About Forever Chemicals:

- **Definition:** These are **human-made toxic chemicals** that do not break down naturally and can persist in the environment for **thousands of years**.
- **Applications:** Used in **water-proofing, heat resistance, detergents, food packaging, and non-stick technologies**.
- **Concerns:** Long-term exposure can lead to serious **health issues** including **liver damage, hormonal imbalance, fertility problems, low infant birth weights, immune system effects, and even cancer**.

India Adds Three More Wetlands to Ramsar List

Context:

India has added **three new wetlands** to the prestigious **Ramsar Sites List**, marking a total of **85 Ramsar Sites** in the country. **Tamil Nadu** now has the highest number of Ramsar Sites.

Newly Added Ramsar Wetlands:

1. Nanjarayan Bird Sanctuary (Tamil Nadu):

- A **shallow wetland** named after **King Nanjarayan**.
- **Dependent on rainfall** from the **Nallar drainage**.
- Acts as a **feeding and nesting habitat** for **resident and migratory birds** and serves as a **water source for agriculture**.

2. Kazhuveli Bird Sanctuary (Tamil Nadu):

- A **brackish shallow lake** located on the **Coromandel Coast**.
- **Connected to Bay of Bengal** by the **Uppukalli creek and Yedayanthittu Estuary**.
- Lies in the **Central Asian Flyway**, serving as a **breeding ground** and source for **aquifer recharge**.

3. Tawa Reservoir (Madhya Pradesh):

- Located within the **Satpura Tiger Reserve** and bordering **Satpura National Park** and **Bori Wildlife Sanctuary**.
- Constructed at the **confluence of Tawa and Denwa rivers**.
- **Tributaries** include the **Malanni, Sonbhadra, and Nagdwari rivers**.

Definition of Wetland:

- **Wetland:** An area of land where water saturation is a significant factor. Wetlands can be found in various forms such as swamps, marshes, and bogs.

Criteria for Wetlands: To qualify as a wetland, an area must meet at least one of the following criteria:

1. **Supports Water Birds:** Regularly supports 20,000 or more water birds.
2. **Biological Diversity:** Contributes to the conservation of biological diversity.
3. **Fish Production:** Supports fish production, which may include spawning or nursery grounds.
4. **Water Quality:** Plays a role in maintaining water quality by filtering pollutants.
5. **Flood Control:** Provides flood control benefits by acting as natural floodplains.
6. **Climate Regulation:** Influences climate regulation, often through carbon sequestration.
7. **Education and Research:** Offers opportunities for education and research.
8. **Cultural Values:** Holds cultural or historical significance for local communities.
9. **Economic Value:** Provides resources or benefits that contribute to the local economy.

Ramsar Sites in India:

- **Total Ramsar Sites:** As of now, India has **85 Ramsar Sites**.
- **Maximum Ramsar Sites by State:** **Tamil Nadu** has the highest number of Ramsar Sites in India.

BIOTECHNOLOGY

Microorganisms in Extreme Environments: Microwave Ovens

Microorganisms thriving in extreme environments, such as microwave ovens, provide insights into their remarkable evolutionary adaptations.

Key Findings

- **Dominant Genera: Bacillus, Micrococcus, and Staphylococcus**—typically found on human skin and surfaces.
- **Food-borne Bacteria: Klebsiella and Brevundimonas** detected in household microwaves.
- **Genetic Diversity:** Laboratory microwave ovens showed the greatest **genetic diversity** of bacteria.
- **Microwave Heating:** Uses **electromagnetic waves (300 MHz to 300 GHz)** to generate heat and inactivate most microorganisms in food.

Bacteria Overview

- **Bacteria:** Microscopic, single-celled organisms; exist in various shapes (spheres, rods, spirals).
 - **Good Bacteria:** Help in digestion (e.g., **Bifidobacteria**).
 - **Bad Bacteria:** Cause diseases (e.g., **Salmonella Typhi** causes typhoid).

Extremophiles: Organisms thriving in extreme environments, such as **hydrothermal vents, Antarctic ice, and Earth's crust.**

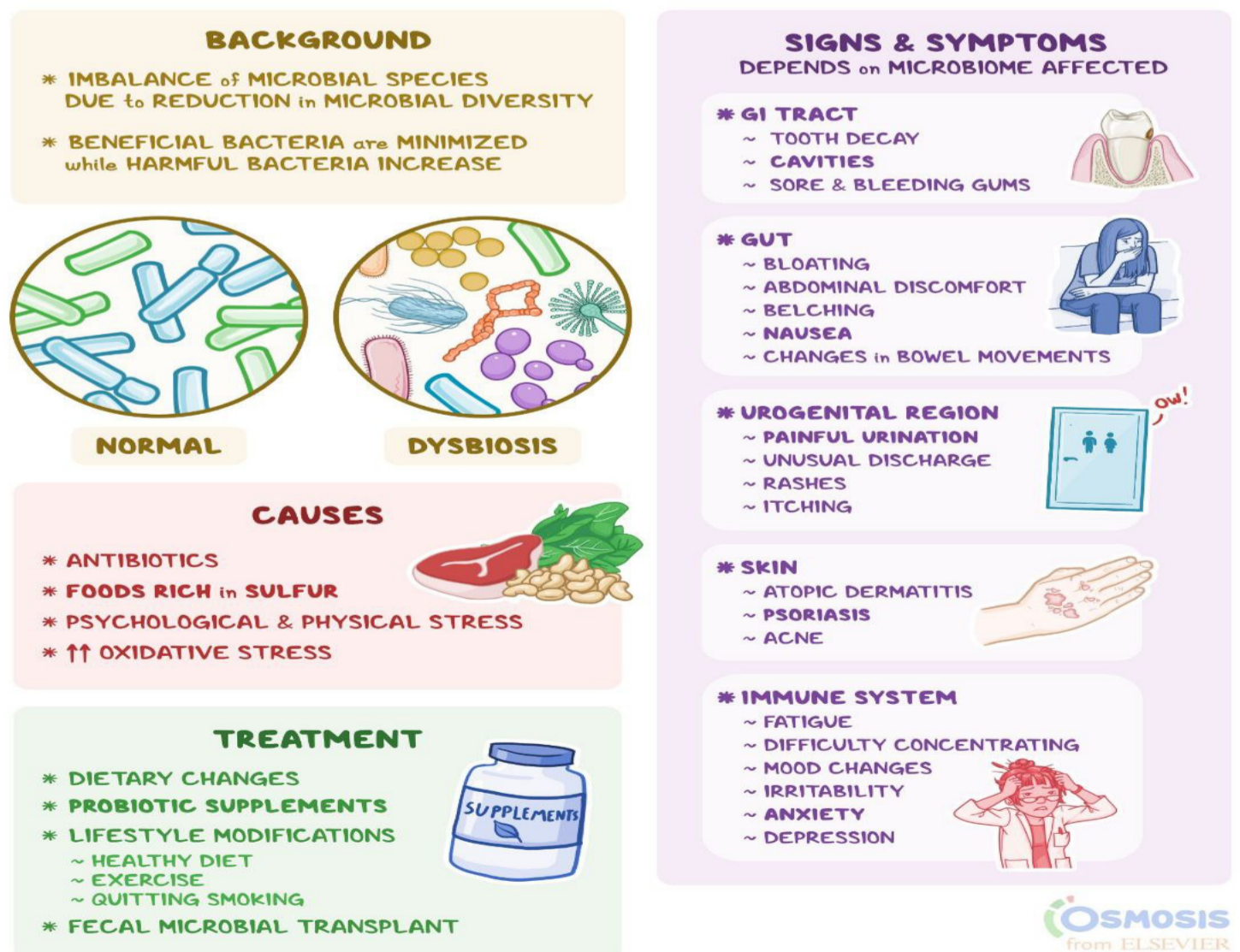
Dysbiosis: Impact of Antibiotic Overuse

Context

- **Overuse and misuse of antibiotics** can harm the **microbiome**, the community of microorganisms in the human body, leading to **dysbiosis**.

Key Details

- **Dysbiosis:** Disruption of the balance of **beneficial bacteria** in the body due to **indiscriminate antibiotic use**.
- **Health Impacts:** Linked to conditions like **inflammatory bowel disease, weakened immune function, metabolic disorders** (e.g., **obesity and diabetes**), and disruptions in the **gut-brain, gut-liver, gut-skin, and gut-respiratory axes**.
- **Antibiotic Misuse:** Can turn antibiotics into **harmful agents**, causing long-lasting health problems by disrupting the **microbiome's balance**.



Silicosis: A Serious Health Risk

Context

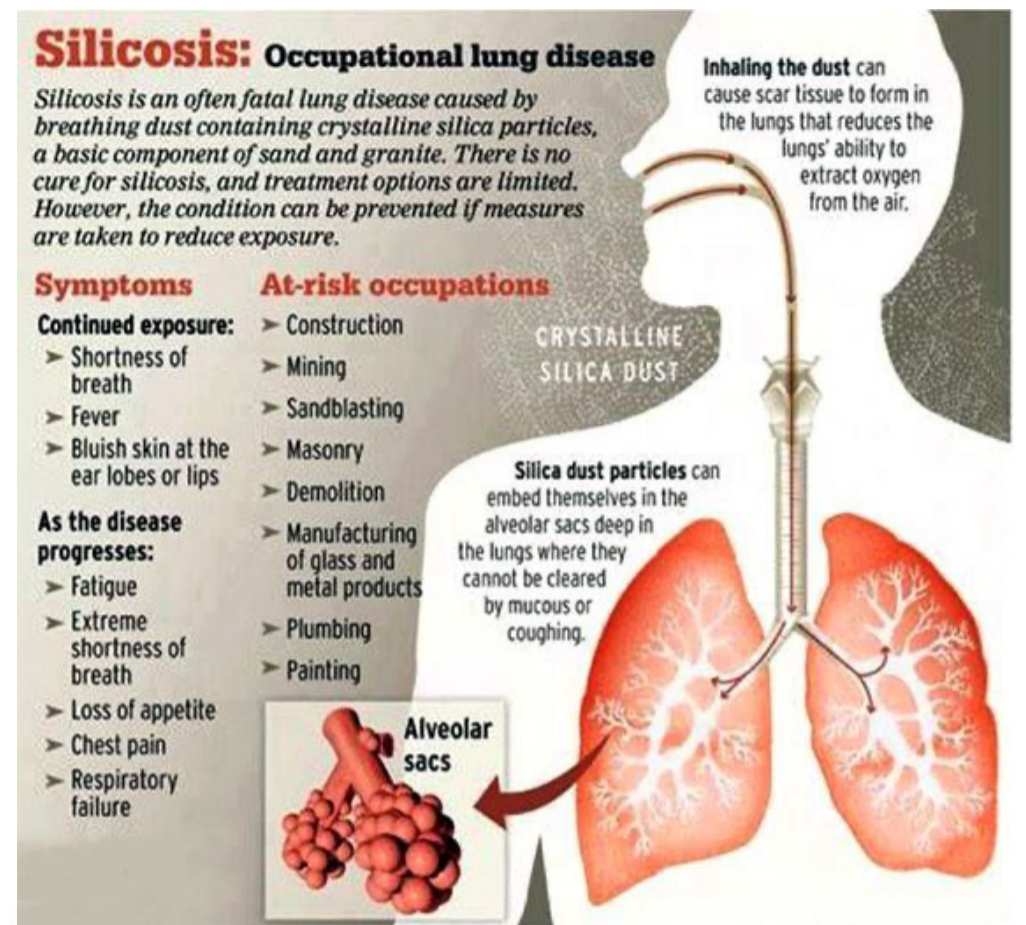
- Researchers warn that current **Permissible Exposure Limits (PEL)** for silica dust in India (0.15 mg/m^3) may still pose serious health risks, leading to **silicosis**.

About Silicosis

- **Silicosis** is a long-term lung disease caused by inhaling **crystalline silica dust** over prolonged periods.
- **Symptoms:** Lung hardening, **shortness of breath**, and can be **fatal**.
- **Progressive Disease:** No cure is currently available.

About Silica

- **Naturally Found:** In rocks like quartz, soil, etc.
- **Associated Industries:** **Construction, mining, oil and gas extraction, pottery, sculpting, glass manufacturing, etc.**



Gurmar (*Gymnema sylvestree*): Anti-Diabetic Medicinal Herb



Context: Researchers discovered the anti-diabetic herb Gurmar on Gaya's Brahmayoni Hill.

About Gurmar

- **Type:** Slow-growing, perennial, woody climber.
- **Location:** Found in **central and southern India** and **tropical Africa**.

Pharmacological Properties

- Contains **Gymnemic acid**, which has **anti-obesity** and **anti-diabetic** properties.
- **Effects:** Reduces body weight and **inhibits glucose absorption**.

Applications

- Used in **dietary supplements** to reduce **body weight, blood cholesterol, and triglyceride levels**.
- **CSIR** used Gurmar to develop the **anti-diabetic drug BGR-34**.
- The first diabetes drug, **Metformin**, was also derived from a medicinal plant (**Galega**).

WHO Declares Monkeypox (Mpox) a Public Health Emergency of International Concern (PHEIC)

Context:

- **Declaration Date:** August 2024
- **Cases and Deaths:** 99,176 cases and 208 deaths reported across 116 countries since 2022.
- **Significance:** This is the second PHEIC declaration within two years.

What is Monkeypox (Mpox)?

- **Virus:** DNA virus from the Poxviridae family.
- **First Identified:** In monkeys in 1958; first human case in 1970 in the Democratic Republic of Congo.

Differences Between Smallpox, Chickenpox, and Monkeypox:

1. Smallpox:

- **Cause:** Variola virus
- **Severity:** Highly severe and often fatal
- **Transmission:** Respiratory droplets and contact
- **Status:** Eradicated in 1980

2. Chickenpox:

- **Cause:** Varicella-zoster virus
- **Severity:** Mild, common in children
- **Transmission:** Respiratory droplets and contact with lesions
- **Prevalence:** Reduced due to vaccination

3. Monkeypox (Mpox):

- **Cause:** Monkeypox virus
- **Severity:** Milder than smallpox, rarely fatal
- **Transmission:** Contact with infected animals or fluids; human-to-human through close contact
- **Endemic:** In parts of Africa

Public Health Emergency of International Concern (PHEIC):

- **Definition:** Declared by WHO under the International Health Regulations (IHR) of 2005 for unusual outbreaks posing international risks and requiring immediate global action.
- **Criteria:**
 1. The event is an “Extraordinary Event.”
 2. It “Constitutes a Public Health Risk” to other states through international spread.
 3. It potentially requires a coordinated international response.
- **Past PHEICs:** Includes H1N1 pandemic, polio, Ebola, Zika, COVID-19, and Mpox.

Benefits of PHEIC Declaration:

- **Global Alert:** Enhances awareness and coordinated action.
- **International Collaboration:** Encourages global cooperation and resource mobilization.
- **Preventive Measures:** Facilitates implementation of measures to prevent international spread.

Monkeypox (Mpox) in India:

- **Cases:** At least 27 laboratory-confirmed cases and one death as of August 2024.
- **Initial Cases:** Reported in Kerala among travelers; later cases detected in Delhi without travel history.
- **Current Status:** Relatively low prevalence but requires vigilance due to potential international spread.



03/08/2022 

MONKEYPOX: WHAT YOU NEED TO KNOW

An outbreak of monkeypox is occurring in many countries:

- WHO has declared a public health emergency of international concern.
- Monkeypox is preventable. Most people recover fully, but some people can get seriously ill.
- Symptoms can be uncomfortable and painful.
- While monkeypox can affect anyone, most cases in this outbreak are among men who have sex with men.
- What we know about the outbreak is changing fast – we are learning more every day.

Symptoms of monkeypox often include:

- Rash on face, hands, feet, body, perianal area or genitals
- Rash in mouth, throat, eyes, vagina and anus
- Fever
- Swollen lymph nodes
- Headaches
- Muscle and back aches
- Low energy
- Painful swelling inside your rectum (proctitis)
- Pain or difficulty when urinating

You can catch monkeypox through close contact with someone who has symptoms including:

- Skin-to-skin (e.g., touching, anal and vaginal sex)
- Face-to-face (e.g., talking, singing, breathing)
- Mouth-to-skin (e.g., oral sex)
- Mouth-to-mouth (e.g., kissing)
- From contaminated bedding, towels, clothing, surfaces or objects

Protect yourself from monkeypox:

- If someone you know is diagnosed with or has suspected monkeypox, avoid close contact with them
- Know the symptoms and check yourself regularly
- If you have symptoms, seek health advice and self-isolate while you wait to get tested
- Get vaccinated if it is available to you
- Follow advice to reduce the risk of infection if you live with someone who has monkeypox

Monkeypox can spread through sex :

- People who have sex with multiple or new partners are most at risk
- Check yourself regularly for symptoms and ask partners to do the same
- If monkeypox is impacting your community, you can reduce your risk by reducing your number of sexual partners, waiting for a while before having sex with any new partners or taking a break from sex
- Have open, non-judgmental conversations. Swap contact details with sexual partners and agree to let each other know if you develop symptoms
- Condoms will prevent some STIs. They may also reduce your risk of exposure to monkeypox, but they will not prevent you becoming infected through close physical contact

If you think you have monkeypox:

- Get advice from a health worker
- Get tested
- Isolate at home if your health worker recommends you do so
- Take care of your rash, physical and mental health
- Protect others by avoiding close contact with them
- If you are sharing a house with others while isolating, stay in separate rooms, frequently clean hands, clean/disinfect objects and surfaces often and open windows
- Avoid contact with your pets

Stigmatising people because of a disease is never ok.
Anyone can get or pass on monkeypox. Together, we can end this outbreak.

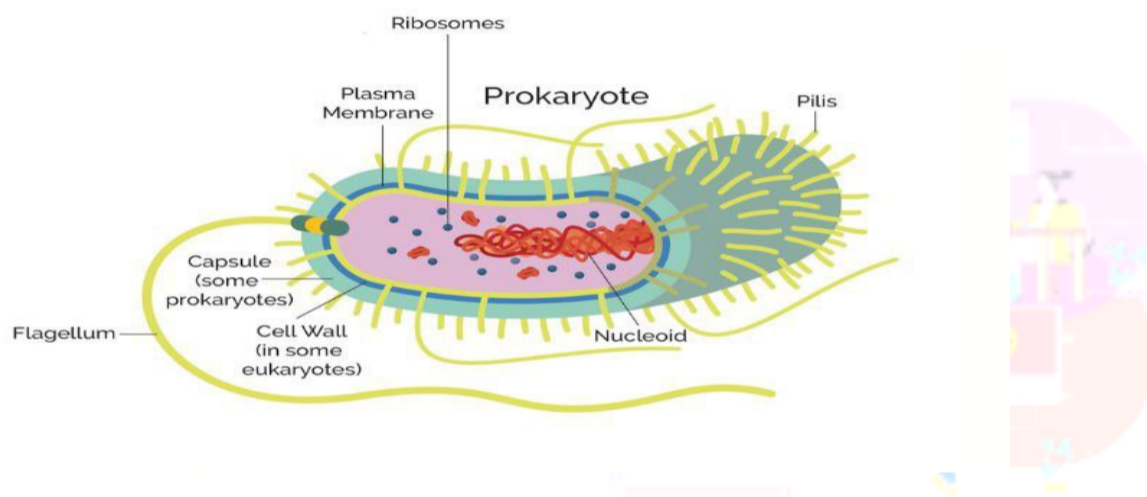
Prokaryotes: Key Insights and Research Findings

- **Recent Research:** Suggests that as ocean temperatures rise, prokaryotes (bacteria and archaea) will experience less biomass decline compared to other marine organisms, potentially leading to increased dominance.

Role in Marine Ecosystems:

- **Ecological Importance:** Prokaryotes are crucial for supporting marine food chains and regulating carbon emissions.

Impact of Shift: An increase in prokaryote dominance may lead to reduced fish populations, which are vital for global food security, and could also affect the ocean's ability to absorb carbon emissions



About Prokaryotes:

1. **Definition:**
 - Organisms whose cells lack a nucleus and membrane-bound organelles.
 - Include bacteria and archaea, each with unique evolutionary lineages.
2. **Characteristics:**
 - **Structure:** Generally small, single-celled organisms with a relatively simple structure.
 - **Diversity:** Include a vast range of forms and functions, adapted to various environments.

Implications of Research:

- **Marine Food Chains:** A shift towards prokaryote dominance could disrupt traditional food webs, affecting marine life dependent on larger organisms.
- **Carbon Sequestration:** Prokaryotes play a role in the carbon cycle; their increased dominance might alter oceanic carbon absorption and emission patterns.

SCIENCE & TECHNOLOGY

Polar Coupled Analysis and Prediction for Services (PCAPS)

Context

- The **World Meteorological Organization (WMO)** launched the **Polar Coupled Analysis and Prediction for Services (PCAPS)** to improve **weather, water, ice, and climate forecasting** in **Arctic and Antarctic regions**.

Key Objectives

- **Enhanced Forecasting:** Aims to develop better **observation systems** and **Earth system models** for polar regions.
- **Safety & Security:** Improves safety for people living or travelling in **polar areas** by providing more accurate predictions.
- **Builds on Previous Work:** Continues the work of the **Polar Prediction Project (PPP)** as part of the **World Weather Research Programme (WWRP)**.
- **Addresses Climate Change:** Focuses on **rapid climate change** in polar regions affecting **Indigenous communities** and local populations.
- **Bridging Science & Society:** Links **scientific research** with **societal needs**, aiding in better decision-making for **extreme weather events**.
- **International Collaboration:** Supports the upcoming **fifth International Polar Year (IPY) 2032-2033**, promoting collaboration between researchers, service providers, and user groups for research-driven services.

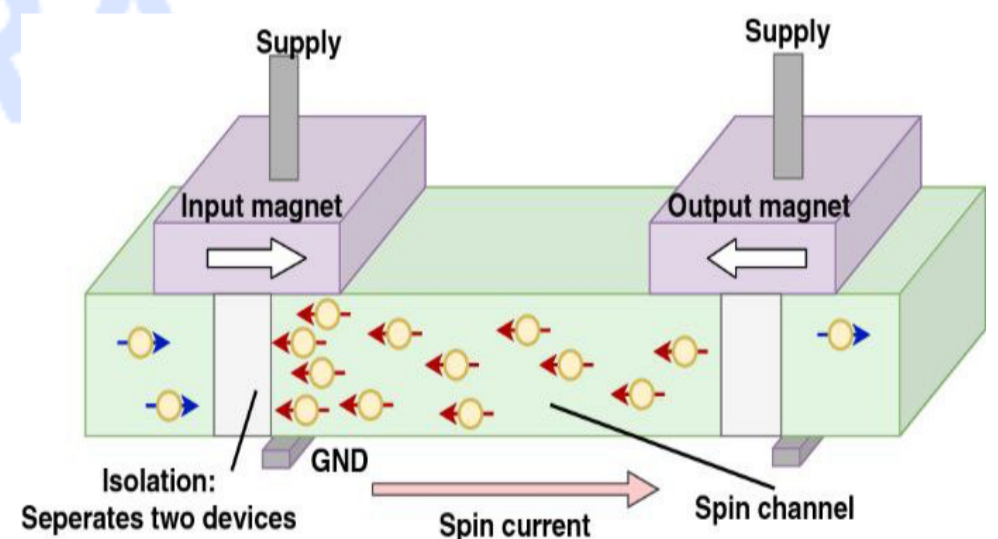
Impact

- **PCAPS** will enhance forecasting capabilities, improve safety, and address the unique challenges posed by **polar climate change**, benefiting both local communities and global scientific efforts.

Spintronics: A Breakthrough in Electronic Devices

Context

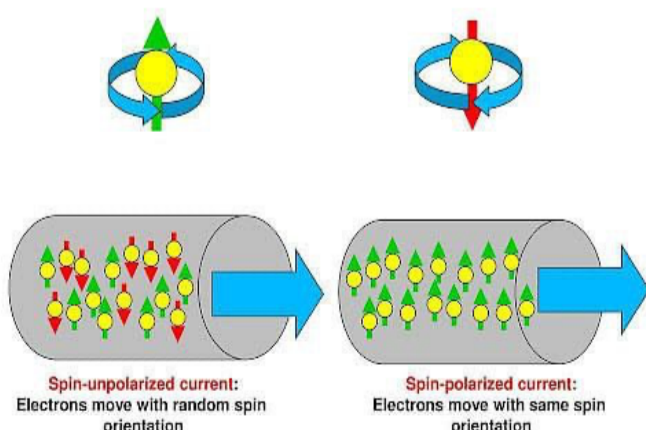
- Researchers developed a **transparent conducting interface** using **spintronics** between two insulating materials, potentially enhancing **data transfer speeds** and **data storage** in **quantum devices**.



Spintronics: Key Information

- **Spintronics:** Utilizes both the **spin** and **charge** of electrons for data processing and storage.
- **Applications:** Key in **quantum computing, nano-electronics, and electronic storage devices**.
- **Advancement:** Researchers created a **conductive interface** between two insulators, enhancing **data transfer speed** and **storage capacity** in **quantum devices**.
- **Potential:** Promises more efficient and faster **electronic systems**, paving the way for breakthroughs in **quantum technology**.

What is spintronics? And why?



Technological Doping

What is Technological Doping?

- **Definition:** Involves the use of advanced **sports equipment or technology** to gain a **competitive edge** over others, often crossing the boundaries of fair play.

Examples:

- **Speedo LZR Racer swimsuits (2008):** Used by many swimmers in the **Beijing Olympics**, these swimsuits were made of special materials that reduced drag, resulting in numerous record-breaking performances. They were later **banned** by the **International Swimming Federation (FINA)** for giving an unfair advantage.
- **Nike Vaporfly shoes:** A similar controversy arose in running, where these shoes were criticized for providing runners with an advantage due to their design, which improved running efficiency.

How It Works:

- **Equipment-based:** Technology doping involves the use of specially designed equipment, clothing, or footwear that enhances an athlete's **speed, endurance, or overall performance**.
- **Examples in Other Sports:** Advanced bicycles in cycling, specialized prosthetics in Paralympics, and enhanced tennis rackets have all come under scrutiny for possibly providing unfair advantages.

Regulation:

- **World Anti-Doping Agency (WADA):** Considers banning technologies that are proven to be **performance-enhancing** or violate the **spirit of sport**.
- **International Sports Federations:** Individual sports organizations also regulate the use of technology to ensure fairness. For instance, **FINA** banned certain swimsuits, while other organizations have set rules on the acceptable use of technology in sports gear.

Challenges:

- **Fairness:** The line between acceptable innovation and unfair advantage is often blurry, raising ethical concerns.
- **Accessibility:** Technological doping creates inequality as not all athletes or teams may have access to cutting-edge technologies, leading to an uneven playing field.

Current Debate:

- As technology advances, regulators and sport's governing bodies face increasing challenges in ensuring that new equipment and innovations align with the **core values of sportsmanship and fair competition**.

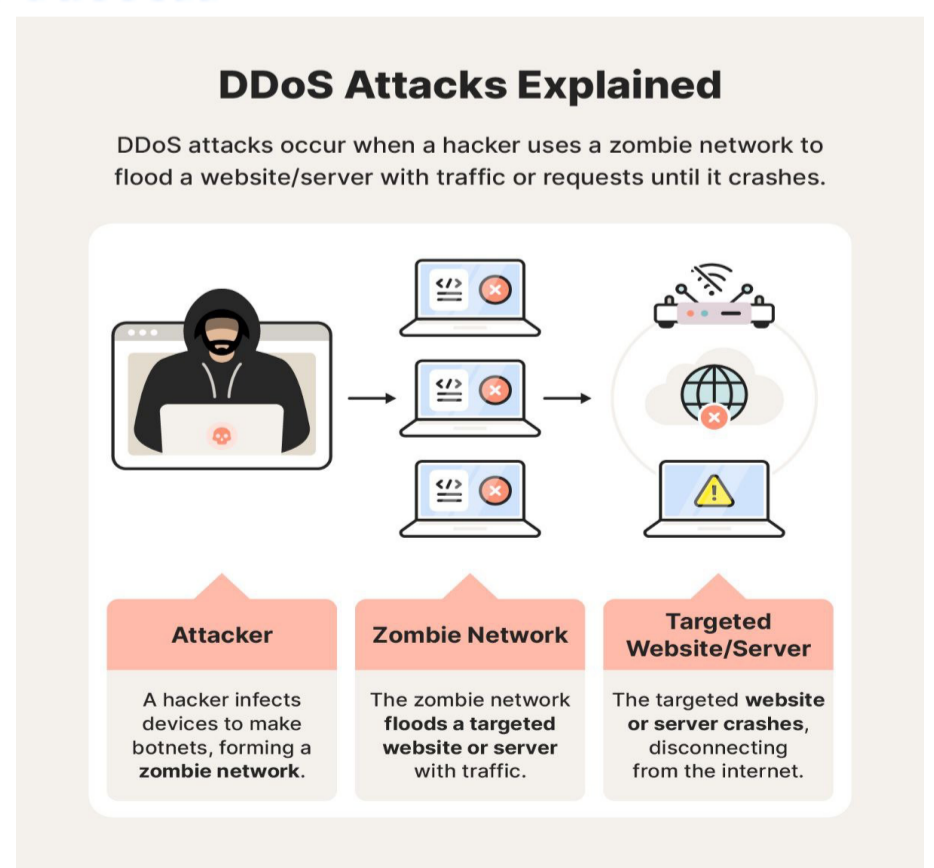
DDoS Cyber Attack: Disruptive Threat to Online Services

Context:

A recent **Distributed Denial of Service (DDoS)** attack caused significant disruptions during the social media interview of a former US President on the platform X.

About DDoS Attacks:

- **Definition:** A **DDoS attack** is a **malicious attempt** to disrupt the normal traffic of a **targeted server, service, or network** by overwhelming it with a **flood of Internet traffic**.
- **Mechanism:** Unlike a single-source **Denial of Service (DoS)** attack, where one internet connection bombards the target with **fake requests**, a **DDoS attack** leverages **multiple compromised computer systems** to generate attack traffic from various sources, making it harder to defend against.



ISRO Launches Earth Observation Satellite EOS-08: Key Details

Launch Details:

- **Mission Name:** SSLV-D3/EOS-08
- **Launch Vehicle:** Small Satellite Launch Vehicle (SSLV)-D3
- **Launch Site:** Satish Dhawan Space Centre, Sriharikota
- **Orbit:** Circular Low Earth Orbit (Altitude: 475 km, Inclination: 37.4°)
- **Mission Life:** 1 year

Satellite Details:

- **EOS-08:** Primary satellite designed for Earth observation.
- **SR-0 DEMOSAT:** Secondary payload developed by Space Kidz India.

Objectives of EOS-08 Mission:

1. **Microsatellite Design:** Design and develop a microsatellite.
2. **Payload Instruments:** Develop payload instruments compatible with the microsatellite bus.
3. **New Technologies:** Incorporate new technologies for future operational satellites.

Payloads of EOS-08:

1. **Electro Optical Infrared Payload (EOIR):**
 - **Function:** Captures images in Mid-Wave & Long Wave Infrared bands.
 - **Applications:** Disaster monitoring, environmental monitoring, etc.
2. **Global Navigation Satellite System-Reflectometry (GNSS-R):**
 - **Function:** Remote sensing to measure ocean winds, soil moisture, Himalayan cryosphere, etc.
3. **SiC UV Dosimeter:**
 - **Function:** Monitors UV irradiance at Gaganyaan mission's crew module viewport.

Purpose: Acts as a high-dose alarm sensor for astronaut safety.

About Earth Observation Satellites (EOS):

- **Purpose:** Designed for Earth observation from orbit.
- **Scope:** Collect information on natural and artificial activities on Earth, including physical, chemical, biological, and human systems.
- **Applications:** Early warning systems, environmental impact monitoring, etc.

About Small Satellite Launch Vehicle (SSLV)-D3:

- **Development:** Third developmental flight of SSLV.
- **Capabilities:** Launches Mini, Micro, or Nano satellites (10 to 500 kg mass) into a 500 km planar orbit.
- **Configuration:**
 - Three solid-fuel-based stages
 - One final liquid-fuel based stage
- **Benefits:**
 - Low cost
 - Short turn-around time
 - Flexibility to accommodate multiple satellites
 - Launch-on-demand feasibility
 - Minimal launch infrastructure requirements



Californium: Overview and Applications

Context:

- **Recent Incident:** Bihar police recently seized a metallic lump suspected to be Californium, a highly radioactive and expensive material. It was later determined to be fake.

About Californium:

1. Element Details:

- **Atomic Number:** 98
- **Appearance:** Silvery-white, synthetic, and highly radioactive.
- **Naming:** Named after the University of California.

2. Properties:

- **Radioactivity:** Strong neutron emitter, making it highly radioactive.
- **Cost:** Extremely expensive due to its production challenges and applications.

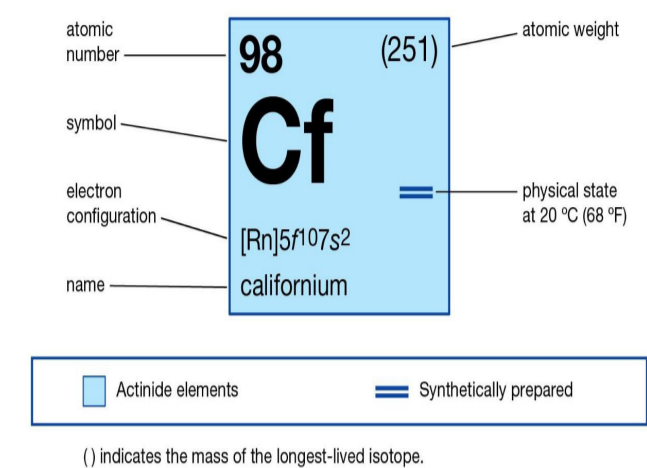
3. Applications:

- **Portable Metal Detectors:** Used in devices to detect metals.
- **Ore Identification:** Helps in identifying gold and silver ores.
- **Nuclear Reactors:** Assists in starting and sustaining nuclear reactors.

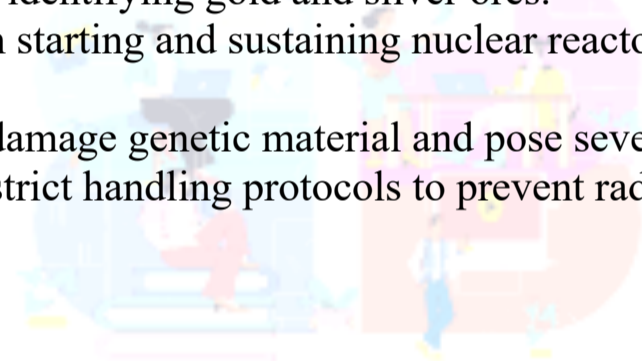
4. Health Risks:

- **Radioactive Hazards:** Can damage genetic material and pose severe health risks.
- **Safety Measures:** Requires strict handling protocols to prevent radiation exposure.

Californium



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REPORTS & RANKINGS

NIRF Rankings 2024: Key Highlights and New Additions

Why in News?

The **National Institutional Ranking Framework (NIRF) 2024**, released by the Ministry of Education, has once again spotlighted top institutions in India's higher education.

Key Highlights of NIRF 2024

- **IIT Madras:** Retained its top position in both the 'Overall' and 'Engineering' categories for six and nine consecutive years, respectively. It also secured second place in the 'Research Institutions' and 'Innovations' categories.
- **IISc Bengaluru:** Topped the 'Universities' and 'Research Institutions' categories for the ninth and fourth consecutive years, respectively.
- **IIM Ahmedabad:** Continued to hold the top spot in the 'Management' category for the fifth consecutive year.
- **AIIMS New Delhi:** Remained the top in the 'Medical' category for seven consecutive years and ranked 7th in the 'Overall' category.
- **Jamia Hamdard:** Led the 'Pharmacy' category, while **IIT Roorkee** topped the 'Architecture and Planning' category.
- **Delhi University (DU):** Made a significant jump from 11th to 6th in the overall rankings, re-entering the top 10. **Hindu College** from DU became the top college for the first time, surpassing **Miranda House**, which held the position for seven years. **St. Stephen's College** ranked third.

New Additions and Categories in NIRF 2024

- **New Categories:** Introduced three new categories—**State Public Universities, Open Universities, and Skill Universities**.
 - **Anna University** and **IGNOU** led in the **State Public Universities** and **Open Universities** categories.
 - **Symbiosis Skill and Professional University (SSPU), Pune** topped the **Skill Universities** category.
- **Looking Ahead:** The Ministry plans to introduce **Sustainability Rankings** in 2025, focusing on environmental sustainability and energy efficiency.
- **Participation:** The number of institutions participating increased from **2,426 in 2016** to **6,517 in 2024**, showing the growing recognition of NIRF rankings.

What is the National Institutional Ranking Framework (NIRF)?

- **About:** NIRF, launched in 2015 by the **Ministry of Education**, ranks higher education institutions in India based on several parameters like teaching, learning, research, and graduation outcomes.

Note on NAAC: NAAC evaluates institutions on overall quality and grades them from **A++ to D**. Unlike NIRF's quantitative rankings, NAAC focuses on qualitative aspects of education

ILO's Global Employment Trends for Youth 2024 Report

Key Highlights

- **Post-Covid Recovery:** Global youth **unemployment rate** in 2023 dropped to **13%**, the lowest in **15 years**, with **64.9 million unemployed youth**, the lowest since 2000.
- **NEET Status:** **20.4%** of youth were **Not in Employment, Education, or Training (NEET)** in 2023; **2 in 3 NEETs** are women.

Global Challenges

- **Inequalities of Opportunity:** **4 in 5** young adults in **high-income** countries have regular jobs, compared to **1 in 5** in **low-income** countries.
- **Regional Disparities:** **Youth labour force growth in Africa by 2050**, while other regions face contraction; **1 in 3 youth** in **Arab states and North Africa** are unemployed.
- **Youth Well-Being:** Concerns over **job loss, economic instability, and lack of social mobility**.
- **Educational Mismatch:** **2 in 3** young workers in **developing economies** hold **mismatched qualifications**.

Recommendations

- **Improve education and training** for better school-to-work transitions.
- **Target policies** for **disadvantaged youth**.
- **Promote entrepreneurship and self-employment**.
- Focus on **gender-responsive policies** for **job creation**.
- **Youth inclusion** in policymaking, **enhanced international cooperation**, and **public-private partnerships**.

PLACES IN NEWS

St. Martin's Island

Context: St. Martin's Island, Bangladesh's only coral island, has gained attention due to political turmoil in the country.

Key Details

- **Geopolitical Significance:** Located in the Bay of Bengal near Myanmar, the island is strategically important due to its proximity to maritime boundaries and interest from global powers like the U.S. and China.
- **Territorial Disputes:** The island has a history of territorial disputes with Myanmar, raising concerns about sovereignty.
- **Political Speculation:** Rumors suggested former Prime Minister Sheikh Hasina refused a U.S. request for a military base on the island, contributing to political tensions.
- **Rohingya Crisis:** The island has been impacted by the Rohingya refugee crisis, with reports of military tensions in the region.



Kursk Region Declares Emergency Amid Ukrainian Incursion

RUSSIA-UKRAINE WAR

Attack on Russian border region of Kursk

Ukraine launched an offensive in Kursk on August 6 in its most significant attack across the border since Russia's full-scale invasion of Ukraine began in February 2022.

Context: Kursk region in Russia declared a “federal-level” emergency following a major Ukrainian incursion.



Key Details

- Significant Ukrainian attack on Russian soil, with fighting near the border town of Sudzha.
- Russian reinforcements have been deployed to contain the situation.
- The incursion marks a notable shift in the war's dynamics, as Ukraine escalates operations on Russian territory.

Implications

- Increased tensions between Russia and Ukraine.
- Possible reinforcement of border defenses by Russia.
- Escalation of the conflict could draw more international attention and alter military strategies on both sides.

Mt. Kilimanjaro Expedition

Context

- An expedition team, under the **Ministry of Defence**, successfully unfurled the **Indian national flag** at the **Uhuru Summit of Mount Kilimanjaro**.

About Mount Kilimanjaro

- **Location:** Tanzania, Africa.
- **Height:** 5,895 meters, making it the **highest peak in Africa**.
- **Significance:** The **largest free-standing mountain** in the world, not part of any mountain range.
- **Type:** A **stratovolcano**, composed of **ash, lava, and rock**.
- **Cones:** Three cones—**Kibo (tallest), Mawenzi, and Shira**.
- **Highest Point:** The highest point on **Kibo's crater rim** is called **Uhuru**.
- **UNESCO Site:** Part of the **Kilimanjaro National Park**, a **UNESCO World Heritage Site**.



Zambia: Key Facts and Features

Context: Zambia Reopening Border with the Democratic Republic of Congo

- **Zambia** is set to reopen its previously closed border with the **Democratic Republic of Congo (DRC)**, highlighting the restoration of cross-border relations and economic exchanges between the two nations.
- This move is significant for both countries, as **Zambia** and the **DRC** share a vital economic and geographic relationship, particularly in trade, mining, and regional stability.

Geographical Location

- **Capital:** Lusaka
- **Region:** Southern Africa, landlocked.
- **Bordering Countries:**
 - **North:** Democratic Republic of Congo and Tanzania.
 - **East:** Malawi and Mozambique.
 - **South:** Zimbabwe and Botswana.
 - **West:** Namibia and Angola.
- **Oceans:** Close proximity to the **Indian and Atlantic Oceans**.



Political and Economic Features

- **Commonwealth Member.**
- **Minerals:** Major producer of **cobalt and copper**.

Geographical Features

- **Climate:** Subtropical with three seasons:
 - **Hot and dry.**
 - **Wet and rainy.**
 - **Cool and dry.**
- **Rivers:** Kafue, Luangwa, and **Zambezi (home to Victoria Falls)**.

Lakes: Bangweulu, Kariba, Mweru, and Tanganyika

President Murmu Honored by Timor-Leste

- **President Droupadi Murmu** was awarded the **Grand-Collar of the Order of Timor-Leste** by President Horta for her contributions to **public service, education, and women's empowerment**.
- **Key MoUs Signed:** President Murmu and Prime Minister Gusmão oversaw the signing of three MoUs:
 1. **Cultural Exchanges.**
 2. **Collaboration between Prasar Bharati and Timor-Leste Radio & TV.**
 3. **Visa exemptions for diplomatic, official, and service passports.**



East Timor Overview

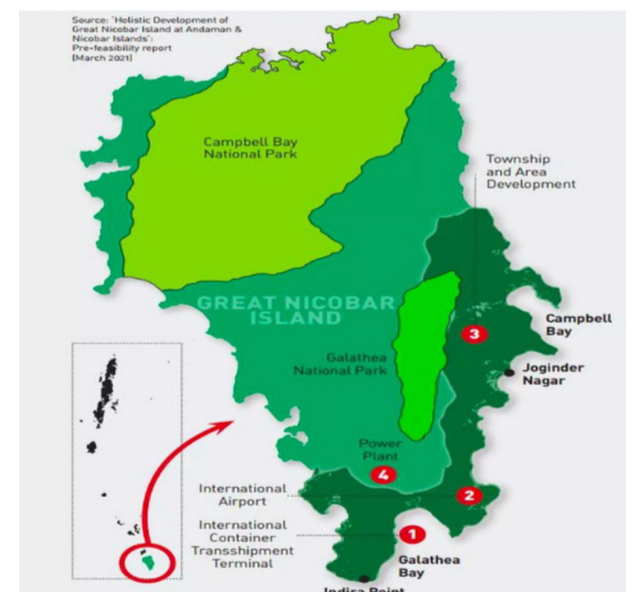
- **Geography:** Bordered by the **Timor Sea, Wetar Strait, Ombai Strait, and Indonesia's East Nusa Tenggara.**
- **Colonial History:** Colonized by **Portugal** in the 18th century, annexed by **Indonesia** in 1975 after Portugal's withdrawal.
- **Independence:** Achieved independence after a **1999 UN referendum** and was recognized by the **UN in 2002.**
- **ASEAN Status:** East Timor holds **observer status** and has applied for full membership.

Galathea Bay Wildlife Sanctuary Denotified for Port Project

- **Denotification:** The **Galathea Bay Wildlife Sanctuary** in **Great Nicobar Island** has been denotified to enable the construction of a **transshipment port.**
- **Ecological Impact:** The area is a crucial **nesting site** for the **endangered giant leatherback turtle.**
- **CRZ-1A Classification:** Previously classified under **CRZ-1A (Coastal Regulation Zone-1A)**, which restricts large construction projects due to its ecological sensitivity.

Key Points:

- **Wildlife Threat:** Potential impact on the habitat of endangered species.
- **Legal Change:** Removal of **CRZ-1A** protection to accommodate infrastructure development.



Panama Canal Faces Climate Change Threat

- **Panama Canal:** A vital **shipping route** connecting the **Atlantic and Pacific Oceans.**
- **Dependence on Freshwater:** The canal relies on **Lake Gatun** to provide freshwater for its lock system.

Key Issue:

- **Climate Change Impact:** **Persistent droughts**, worsened by climate change, have significantly lowered water levels in Lake Gatun.
- **Operational Strain:** Reduced water levels threaten the canal's capacity to accommodate ships, impacting global trade.

