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WEEKLY UPDATES

DATE : 11th Nov- 17th Nov

POLITY & GOVERNANCE

Justice Sanjiv Khanna Takes Oath as India's 51st Chief Justice

Syllabus Coverage- GS Paper II: Indian Constitution - Appointment to Key Posts, Judiciary, and Governance.

Context

Justice **Sanjiv Khanna** was sworn in as the **51st Chief Justice of India (CJI)** on November 12, 2024. The oath of office was administered by President **Droupadi Murmu** at Rashtrapati Bhavan, marking a significant milestone in India's judiciary.

Appointment of Chief Justice of India

1. Convention of Appointment

- The **senior-most Supreme Court judge**, deemed fit for the role, is typically appointed as CJI.
- The outgoing CJI **recommends** their successor to the Union Minister of Law, Justice, and Company Affairs.

2. **Process of Appointment**

- The recommendation is forwarded to the **Prime Minister**, who advises the **President** on the appointment.
- **Article 124(2)**: Judges of the SC, including the CJI, are appointed by the **President** and hold office until the age of **65 years**.

3. **Historical Deviations:** This convention was breached in **1964, 1973, and 1977**, when seniority was not followed.

Key Roles of the Chief Justice of India

1. **First Among Equals**: The Supreme Court, in **State of Rajasthan v. Prakash Chand (1997)**, clarified that while the CJI is the **head of the judiciary**, they do not hold superior judicial authority over other SC judges.
2. **Master of the Roster:** The CJI has the **exclusive power** to constitute Benches, including **Constitution Benches**, to hear cases.
3. **Head of Collegium:** The CJI heads the **Collegium system**, responsible for judicial appointments and transfers in the higher judiciary.
4. **Administrative Powers**: **Article 146**: The CJI is empowered to appoint officers and servants of the SC or delegate this authority.

About the Collegium System

1. **Purpose**: The **Collegium** recommends the appointment of judges to the Supreme Court (SC) and High Courts (HC).
2. **Legal Provisions**: Judges are appointed by the President under:
    - **Article 124**: Appointment of SC judges.
    - **Article 217**: Appointment of HC judges.
3. **Composition**
    - **For SC appointments**: Consists of the **CJI** and the **four senior-most SC judges**.
    - **For HC appointments**:
        - **HC Collegium**: Chief Justice of the concerned HC and **two senior judges** of the HC.
        - **SC Collegium**: CJI and **two senior-most SC judges**.

Significance of the Chief Justice of India

1. **Judicial Leadership:** As the head of the judiciary, the CJI ensures the effective functioning of the Supreme Court and upholds the **independence of the judiciary**.
2. **Custodian of Justice:** Through their leadership in the **Collegium**, the CJI ensures that judicial appointments are fair, transparent, and in line with constitutional principles.
3. **Policy Influence:** The CJI plays a critical role in influencing judicial reforms and addressing critical issues like **judicial backlog** and procedural efficiency.

Challenges in the Role of CJI

1. **Judicial Backlog:** Over **70,000 pending cases** in the SC require effective docket management.
2. **Collegium Criticism:** Lack of **transparency** and accountability in judicial appointments is often highlighted.
3. **Balancing Administrative and Judicial Roles:** The CJI must efficiently handle both **case hearings** and administrative responsibilities.

Way Forward

1. **Streamline the Collegium Process:** Enhance transparency through public disclosures of criteria for appointments and decisions.
2. **Technology Adoption:** Leverage **AI and digital tools** to reduce pendency and improve case management.
3. **Strengthen Judicial Infrastructure:** Focus on improving physical and digital infrastructure to support the judiciary.
4. **Inclusive Judicial Appointments:** Ensure representation from diverse backgrounds, including marginalized communities, in the judiciary.

Parliamentary Committee to Review Mechanisms to Curb Fake News

Syllabus Coverage

- **GS Paper II**: Governance, Transparency, and Accountability.
- **GS Paper III**: Challenges to Internal Security through Communication Networks.

Context

The **Parliamentary Standing Committee on Communications and Information Technology** has initiated a review of mechanisms to curb **fake news**, which continues to undermine public trust, threaten democracy, and disrupt social harmony.

What is Fake News?

1. **Definition: Fake news** refers to **false or misleading stories** lacking verifiable facts, quotes, or sources.
    - Includes:
        - **Misinformation**: Accidental spread of inaccuracies.
        - **Disinformation**: Intentional spread of false information.
2. **Examples**
    - Misleading election campaigns.
    - Manipulated visuals or quotes leading to social unrest.

Need for Regulating Fake News

1. **Right to Information (RTI)**
    - **Fake news undermines citizens' RTI**, upheld as a fundamental right under **Article 19(1)(a)** (freedom of speech).
    - **Case Reference**: **Raj Narayan vs. Uttar Pradesh Government** (SC).
2. **Threats to Democracy:** Influences **voter behavior**, incites **riots**, and causes **social unrest**.
3. **Information Bubbles:** Algorithms reinforce **prejudices** like **racism** or **misogyny**, amplifying biases in society.

Challenges in Regulating Fake News

1. **Internet Penetration:** Over **55% of Indians** had internet access in 2023 (IAMAI report), creating a vast digital space for fake news proliferation.
2. **Digital Illiteracy:** Only **38% of households** in India are digitally literate, limiting the ability to identify fake news.
3. **Potential Curtailment of Free Speech**
    - Fear of misuse of fake news regulation mechanisms to suppress dissent.
    - Example: **Bombay High Court** struck down the **Fact Check Unit (FCU)** of PIB for potential overreach in flagging fake news related to government affairs.

Initiatives to Prevent Spread of Fake News

1. **Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021:** Provides a framework for regulating content by **online publishers** and **digital platforms**.
2. **Bharatiya Nyaya Sanhita, 2023: Section 353** criminalizes the spread of false information or rumors, including electronically, with intent to cause public harm.
3. **Information Technology Act, 2000: Section 66D** penalizes cheating by personation using computer resources.
4. **Media Awareness Campaigns:** Encouraging public to cross-verify news using authentic sources like **government websites** and **credible news outlets**.

Recommendations for Tackling Fake News

1. **Strengthening Digital Literacy:** Expand initiatives like **PMGDISHA** (Pradhan Mantri Gramin Digital Saksharta Abhiyan) to teach digital literacy in rural and underserved areas.
2. **Empowering Fact-Checking Mechanisms:** Ensure the independence and transparency of **fact-checking units**, avoiding misuse for political purposes.
3. **Algorithm Accountability:** Hold social media platforms accountable for **amplification of fake news** through algorithms.
4. **Collaboration with Stakeholders:** Engage **civil society**, **tech platforms**, and **educational institutions** to build comprehensive solutions.

5. **Legal Frameworks:** Harmonize existing laws with the need to balance **free speech** and **accountability**.
6. **Public Awareness Campaigns:** Promote mass campaigns emphasizing the importance of **verifying sources** and understanding the risks of sharing unverified content.

Inter-State Council (ISC)

Context

The **Inter-State Council (ISC)** has been reconstituted to strengthen cooperative federalism in India.

About ISC

1. **Definition and Role:** A constitutional body that serves as a platform for **Centre-State and Inter-State coordination and cooperation**.
2. **Genesis:** Established under **Article 263** of the Constitution by a **Presidential Order in 1990**, based on the recommendations of the **Sarkaria Commission**.
3. **Composition**
    - **Chairman**: Prime Minister.
    - **Members**:
        - Chief Ministers of all states.
        - Chief Ministers of Union Territories (UTs) with Legislative Assemblies.
        - Administrators of UTs without Legislative Assemblies.
        - Six **Union Cabinet Ministers** nominated by the Prime Minister.

Significance of ISC

1. **Platform for Dialogue:** Provides a structured mechanism for resolving Centre-State and Inter-State disputes.
2. **Promotes Cooperative Federalism:** Encourages consultation on national policies and issues affecting States.
3. **Strengthens Governance:** Fosters collaboration for effective implementation of **national programs**.

Challenges in ISC's Functioning

1. **Irregular Meetings:** ISC meetings are not convened frequently, reducing its efficacy.
2. **Limited Authority:** Functions largely as an advisory body with no binding decisions.
3. **Lack of Follow-Up:** Recommendations often lack implementation or monitoring mechanisms.

Way Forward for ISC

1. **Regular Meetings:** Schedule **annual sessions** to address emerging Centre-State and Inter-State issues.
2. **Empowering ISC:** Strengthen its authority to ensure compliance with its recommendations.
3. **Follow-Up Mechanisms:** Establish frameworks to monitor the implementation of its resolutions.
4. **Inclusivity:** Incorporate voices from civil society and local governments for holistic discussions.

"Bulldozer Justice": Ensuring Rule of Law in Demolitions

Syllabus Coverage- GS Paper II: Polity and Governance – Rule of Law, Fundamental Rights, and Judiciary.

Context

The **Supreme Court of India**, in its judgment in **Demolition of Structures v. and Ors**, issued guidelines to ensure that **due process** is followed during property demolitions, addressing concerns surrounding the practice often termed as **"Bulldozer Justice."**

What is Bulldozer Justice?

- **Definition**: Refers to the use of bulldozers and heavy machinery to demolish properties of individuals accused of crimes, often without following due legal procedures.
- **Symbolism**: Represents **instant punitive action** bypassing judicial processes, consolidating executive power.

Examples of Bulldozer Justice

1. **Madhya Pradesh**: Properties demolished in **Khargone** following communal clashes.
2. **Haryana**: Demolitions in **Nuh** after communal violence.
3. **Delhi**: Bulldozing in **Jahangirpuri** post-riots in April 2022.

Concerns Regarding Bulldozer Justice

1. Violation of Rule of Law: Bypasses established legal procedures like prior **notices** and **hearings**.

2. Breach of Fundamental Rights: Violates the **right to shelter** under **Article 21** of the Indian Constitution.

3. Presumption of Innocence: Penalizes individuals before proving guilt in a court of law.

4. Targeting Minorities: Disproportionate impact on **Muslim communities**, raising concerns about **communal bias**.

5. Authoritarian Practices: Undermines **democratic governance**, empowering the executive to act as **judge, jury, and executioner**.

6. Ethical Concerns: Punishes **entire families**, conflating accountability for crimes with property ownership.

Supreme Court Judgments on Demolitions

1. **Olga Tellis vs. Bombay Municipal Corporation (1985):** Evictions without **prior notice** violate the **right to livelihood** under Article 21.
2. **Municipal Corporation of Ludhiana vs. Inderjit Singh (2008):** Demolitions must follow due legal process, including **notice** and **hearings**.
3. **Punjab and Haryana High Court (Nuh, 2023):** Stopped demolitions citing lack of **due process** and **ethnic targeting**.

Supreme Court's Guidelines for Demolitions

1. **Notice Period:** Minimum **15 days' notice** to property owners before demolition.
2. **Transparency:** Notices and orders must be uploaded in real-time on **digital portals**.
3. **Hearing and Final Order:** Demolition orders must include reasons why demolition is the only option.
4. **Post-Order Period:** A **15-day window** must be provided for appeals or voluntary evacuation.
5. **Videography and Accountability :**Entire demolition process must be recorded, and responsible officials listed.
6. **Punitive Measures:** Officials violating guidelines will be personally accountable for:
    - **Restoring properties**.
    - **Paying damages**.

Way Forward

1. **Strengthening Rule of Law:** Ensure **strict adherence** to legal processes, protecting citizens' rights.
2. **Judicial Oversight:** Establish **specialized tribunals** for cases of illegal demolitions to expedite justice.
3. **Community Engagement:** Foster dialogue with affected communities to address grievances effectively.
4. **Accountability Mechanisms:** Develop robust systems to hold officials accountable for misuse of power.
5. **Training and Awareness:** Sensitize authorities about **constitutional safeguards** and **due legal processes**.

Participatory Approaches in AI Development and Governance: Insights from IIT Madras Paper

Syllabus Coverage

- **GS Paper II**: Governance, Transparency, and Accountability.
- **GS Paper III**: Science and Technology - Developments and Their Applications in Governance.

Context

A paper released by **IIT-Madras** highlights the significance of **Participatory Approaches in AI Development and Governance** to enhance **fairness**, **trustworthiness**, and **outcomes** in AI systems. The study emphasizes involving diverse stakeholders in AI creation and governance to mitigate biases and improve inclusivity.

About Participatory AI (PAI)

1. **Definition: Participatory AI** involves engaging a **broad spectrum of stakeholders**—beyond just technology developers—in the design, development, and governance of AI systems.

2. **Core Tenets of PAI:** Derived from **participatory governance principles**, emphasizing inclusivity, transparency, and collaborative decision-making.

3. **Need for PAI:** Increasing deployment of AI in **sensitive public domains** (e.g., facial recognition in law enforcement) necessitates a **balanced and accountable approach**.

Benefits of Participatory AI

1. **Counters Unilateral Decision-Making:** Reduces **top-down impositions** in AI deployment, preventing contentious breakdowns.

2. **Promotes Inclusion and Fairness:** Addresses issues like **bias and discriminatory outputs**, ensuring communities impacted by AI have a voice in its implementation.

3. **Establishes Feedback Loops:** Facilitates **technical issue identification** and post-deployment impact assessments through stakeholder inputs.

4. **Builds Trustworthiness:** Enhances confidence by reducing **false positives** and **false negatives**, leading to **enthusiastic adoption** of AI systems.

Challenges with Participatory AI

1. **Co-optation by Dominant Actors:** Risk of **domination by powerful stakeholders** using the process to serve vested interests.
2. **Limited Participation of Non-Experts:** Current governance models largely engage **industry experts, bureaucrats, and select civil society members**, excluding grassroots voices.
3. **Participatory Washing and Tokenism:** Superficial participation efforts often undertaken for **formal compliance** rather than meaningful engagement.
4. **Transparency Paradox:** Sharing information about algorithms risks **misuse by malicious actors**, creating a trade-off between openness and security.

Participatory Governance in India and Globally

1. **Land Acquisition Act, 2013:** Mandates **social impact assessment** studies involving affected families in the decision-making process.
2. **Forest Rights Act, 2006:** Recognizes **Gram Sabha** as a statutory institution, ensuring **democratic and participatory governance**.
3. **Nagoya Protocol on Access and Benefit Sharing:** Requires equitable sharing of benefits from the use of traditional knowledge with **indigenous communities**.

Significance of PAI

1. **Human-Centric AI Development:** Aligns AI systems with **societal values**, ensuring outcomes are beneficial and inclusive.
2. **Ethical AI Deployment:** Reduces risks of **bias, discrimination**, and **unethical practices** in AI applications.
3. **Better Governance:** Enhances **transparency and accountability** in AI deployment across sensitive domains like law enforcement and public health.

Way Forward

1. **Broaden Stakeholder Base:** Involve **local communities**, **grassroots organizations**, and **non-experts** in the AI development process.
2. **Institutionalize Participatory Frameworks:** Embed participatory processes in **policy frameworks** governing AI deployment.
3. **Focus on Capacity Building:** Train non-experts and marginalized communities to effectively participate in AI-related decisions.
4. **Safeguard Against Co-optation** Develop **robust checks** to prevent powerful actors from dominating participatory processes.
5. **Secure Transparency without Risk** Strike a balance in information-sharing practices to avoid risks of **algorithm misuse**.

Cairo Call to Action

Context: **The** 12th World Urban Forum (WUF)**, held in** Cairo, Egypt**, concluded with the adoption of the** 10-point Cairo Call to Action**, emphasizing sustainable urbanization and inclusive city development.**

About the World Urban Forum (WUF)

- **Established**: 2001 by the United Nations.
- **Objective**: Premier global platform to discuss **sustainable urbanization** challenges and solutions.

Key Highlights of the Cairo Call to Action

1. **Addressing the Global Housing Crisis :** Calls for **urgent measures** to provide affordable and safe housing.
2. **Inclusive Urban Spaces:** Emphasizes **sharing urban spaces** equitably among diverse populations.
3. **Improved Urban Planning:** Advocates for planning that delivers **better local outcomes** and addresses community needs.
4. **Local Action for Global Goals:** Encourages achieving **global goals** like SDGs through **local-level initiatives**.
5. **Representation of Local Actors:** Promotes inclusion of **local actors** in policy-making and governance.
6. **Building Alliances:** Focuses on forming partnerships to **scale local impacts**.
7. **Unlocking Finance:** Urges innovative financing mechanisms for cities and communities.
8. **Equity and Justice:** Stresses ensuring **social and environmental justice** in urban planning.
9. **Leveraging Grassroots Data:** Advocates for using **local and grassroots data** to make informed decisions.

10. **Culture and Heritage for Sustainability:** Recognizes culture and heritage as **assets** for urban sustainability.

Significance of the Cairo Call to Action

1. **Addresses Urban Challenges:** Tackles issues like **housing shortages**, inequitable urban growth, and climate impacts.
2. **Promotes Inclusive Development:** Advocates for **participatory planning** and **local representation** in urban governance.
3. **Focuses on Resilient Cities:** Calls for sustainable cities capable of withstanding **economic and environmental shocks**.

Moran and Mottock Communities Demand Scheduled Tribe Status

Syllabus Coverage- GS Paper II: Government Policies and Interventions - Issues Relating to Development and Welfare of Vulnerable Sections.

Context: The Moran and Mottock communities **in Assam recently staged protests in** Tinsukia**, demanding recognition as** Scheduled Tribes (ST)**. Their demands reflect aspirations for equitable access to educational, employment, and welfare opportunities.**

About the Moran Community

1. Ethnic Background

- Indigenous group residing in **Assam** and **Arunachal Pradesh**.
- Belong to the **Tibeto-Burman linguistic family**, part of the **Kachari ethnic group**.

2. Language and Culture

- Historically spoke the **Moran language**, related to **Dimasa**, but now predominantly speak **Assamese**.
- Cultural practices have been influenced by **Vaishnavism** after large-scale conversions.

3. Current Demand

- Seeking **Scheduled Tribe (ST)** status for:
  - **Educational opportunities**: Reservations in schools, colleges, and universities.
  - **Employment**: Preferential quotas in public sector jobs.
  - **Social welfare**: Inclusion in government welfare schemes.

About the Mottock Community

1. **Ethnic Identity:** Indigenous group of Assam with shared cultural and historical roots with the Moran community.
2. **Cultural Practices:** Known for preserving unique customs while integrating with Assamese mainstream culture.
3. **ST Status Demand:** Advocating for recognition as **Scheduled Tribe** for socio-economic upliftment.

Other Communities in the News

1. Tai Ahoms

- Historical significance: Descendants of the rulers of the **Ahom Kingdom**, which ruled Assam for 600 years.
- Demand: Seeking ST status to protect their identity and secure economic and social benefits.

2. Koch Rajbongshis

- Indigenous to **Assam** and **West Bengal**.
- Known for their unique cultural heritage and traditions.
- Fighting for ST recognition to preserve their **cultural identity**.

3. Chutias

- Historically significant community that played an essential role in Assam's history.
- Demand for ST categorization is rooted in preserving their **heritage and social mobility**.

4. Adivasis

- Comprise mainly **tea garden workers**, originally from Central India, settled in Assam.
- Seeking ST status to gain access to **education**, **healthcare**, and **employment benefits**.

Significance of the ST Status Demand

1. **Economic Empowerment:** Access to **employment reservations** and **financial aid** for livelihood development.
2. **Educational Opportunities:** Reservations in **educational institutions** can improve literacy and skill development.
3. **Social Inclusion:** Recognition as ST ensures **protection of cultural identity** and greater representation in policymaking.

Challenges in Granting ST Status

1. **Ethnic Complexity:** Balancing demands from multiple communities without alienating others.
2. **Political Implications:** Concerns over political and electoral dynamics in **Assam**.
3. **Administrative Challenges:** Categorizing and verifying the eligibility of communities for inclusion under the ST list.
4. **Resource Allocation:** Ensuring fair distribution of **benefits** without overwhelming existing resources.

Way Forward

1. **Comprehensive Assessment:** Conduct socio-economic surveys to assess the community's **backwardness** and eligibility for ST status.
2. **Inclusive Policy Design:** Ensure all demands are considered while maintaining harmony among Assam's diverse communities.
3. **Strengthen Cultural Preservation:** Promote programs to preserve and document **languages, traditions, and heritage**.
4. **Dialogue and Collaboration:** Foster discussions between community leaders, government, and civil society to arrive at equitable solutions.

CAG Report Highlights Gaps in Implementation of the 74th Constitutional Amendment Act (CAA), 1992

Syllabus Coverage

- **GS Paper II**: Polity – Devolution of Powers and Local Governance.
- **GS Paper III**: Economy – Municipal Finances, Urban Development.

Context: The Comptroller and Auditor General (CAG) **released a** Compendium of Performance Audits **on the implementation of the** 74th Constitutional Amendment Act (CAA), 1992**, highlighting key issues and providing actionable recommendations for strengthening** Urban Local Self-Governments (ULSGs)**.**

About the 74th Constitutional Amendment Act (CAA), 1992

1. **Introduction:** Provided **constitutional status** to Urban Local Bodies (ULBs) under **Part IXA** of the Constitution.
2. **Twelfth Schedule:** Enumerates **18 specific functions** to be devolved to ULSGs, including urban planning, public health, and education.
3. **Objective:** Empower ULSGs to function as institutions of **self-government** through decentralization of powers.

Key Findings of the CAG Report

1. Limited Autonomy: Though **17 functions** from the Twelfth Schedule have been devolved by law, only **4 functions** are effectively devolved with **complete autonomy**.

2. Women's Representation: 50% reservation for women implemented in **6 out of 14 states**, exceeding the constitutional mandate of **33%**.

3. Financial Weaknesses

- **Own Revenue**: Only **32% of total revenue** of ULSGs is self-generated; the rest depends on Union and State grants.
- **Resource-Expenditure Gap**: ULSGs face a **42% shortfall** between their resources and expenditure.
- **Development Expenditure**: Only **29% of spending** goes toward programmatic and developmental work.

4. Workforce Deficit: 37% average staff vacancies across ULSGs due to ineffective workforce management.

Recommendations for Effective Implementation

1. Strengthen Decentralization

- Fully devolve **planning, regulation, and execution** powers to ULSGs.
- Engage ULSGs in **critical urban governance functions**.

2. Empower State Election Commissions (SECs)

- Ensure **timely municipal elections** to strengthen democratic processes.

3. Enhance Financial Sustainability

- Improve ULSGs' **tax collection capacity** through digitization and efficient revenue administration.
- Enable access to **innovative financing mechanisms**, such as municipal bonds and PPP models.

4. Workforce Management

- Develop a **comprehensive workforce strategy** to fill vacancies in ULBs.
- Provide skill-based training to enhance administrative and technical capacities.

Challenges in Implementation of the 74th CAA

1. **State Reluctance:** Many states hesitate to transfer funds, functions, and functionaries (3Fs) to ULSGs.
2. **Lack of Financial Autonomy:** Heavy dependence on state and central transfers limits ULSGs' ability to independently finance urban development.
3. **Inadequate Infrastructure:** Poor workforce and technical capacity hinder effective governance and service delivery.

4. **Unclear Accountability:** Overlapping responsibilities between state governments and ULSGs create governance inefficiencies.

Significance of Strengthening ULSGs

1. **Urban Development:** Effective ULSGs can address **urban challenges**, such as housing, sanitation, and transportation.
2. **Inclusive Governance:** Women's participation and better representation can improve inclusivity and grassroots democracy.
3. **Self-Sufficiency:** Financially robust ULSGs can reduce dependence on state and central funding.
4. **Alignment with SDGs:** Strengthened urban governance contributes to achieving **Sustainable Development Goal 11 (Sustainable Cities and Communities)**.

Way Forward

1. **Legal Reforms:** Amend state laws to ensure mandatory devolution of all **Twelfth Schedule functions**.
2. **Capacity Building:** Conduct training programs for elected representatives and officials to improve governance skills.
3. **Integrated Urban Planning:** Leverage technology and data analytics for efficient urban service delivery.
4. **Citizen Participation:** Enhance civic engagement through participatory governance initiatives.

First-of-Its-Kind Finance Commissions' Conclave by Ministry of Panchayati Raj

Syllabus Coverage

- **GS Paper II**: Governance – Devolution of powers and finances to local levels and challenges therein.

Context: The Ministry of Panchayati Raj **organized a groundbreaking Finance Commissions' Conclave to discuss the role, challenges, and reforms needed to strengthen** State Finance Commissions (SFCs)**, pivotal for empowering local bodies in India.**

About State Finance Commissions (SFCs)

1. **Constitutional Provision**: Established under **Article 243I** of the Indian Constitution through the **73rd Amendment Act (1992)**.
2. **Tenure**: Constituted every **five years** by the **Governor** of the state.
3. **Mandate**: To review the financial position of **Panchayats (Article 243I)** and **Municipalities (Article 243Y)** and provide recommendations on:
    - **Tax Distribution**: Between the state and local bodies.
    - **Assignment of Taxes/Duties**: To local bodies.
    - **Grants-in-Aid**: From the state to local bodies.

Challenges Faced by SFCs

1. **Non-Compliance with Timelines**:
    - Several states fail to constitute SFCs on time.
    - Example: As per the **15th Finance Commission (FFC) Report (2020)**, only 15 states had constituted their 5th or 6th SFCs.
2. **Data Deficiencies**: States do not maintain or provide **accurate data** on local body finances, leading to ad-hoc and generalized recommendations.
3. **Delay in Action Taken Reports (ATR)**: States often fail to draft and present **Action Taken Reports** on SFC recommendations to the legislature.

4. **Ignored Recommendations**: Unlike **Central Finance Commissions (CFCs)**, SFC recommendations are often disregarded or partially implemented by states.
5. **Limited Autonomy of Local Bodies**: Lacks effective devolution of financial powers and responsibilities to local bodies.

Steps to Address SFC Challenges

1. **Strict Enforcement**:
   - The **15th Finance Commission** recommended withholding grants for states not complying with SFC provisions by **March 2024**.
   - This has led to almost all states, except **Arunachal Pradesh**, constituting SFCs.
2. **Capacity Building**: Strengthen institutional frameworks and capacity to ensure **data accuracy** and **effective analysis**.
3. **Uniform Guidelines**: Develop comprehensive guidelines for SFCs to ensure consistency across states.
4. **Timely ATR Submission**: Mandate **timely submission** of Action Taken Reports to ensure transparency and accountability.
5. **Digital Platforms for Data**: Use **digital infrastructure** for real-time data collection and reporting on local body finances.

Significance of Strengthening SFCs

1. **Improved Financial Devolution**: Ensures **equitable distribution of resources** between state governments and local bodies.
2. **Strengthening Local Governance**: Empowers Panchayats and Municipalities to address local needs effectively.
3. **Transparency and Accountability**: Better oversight of local body finances enhances public trust.
4. **Alignment with SDGs**: Strengthened local bodies contribute to achieving the **Sustainable Development Goals (SDGs)** by 2030.

INTERNATIONAL RELATIONS

India Achieves Significant Growth in Intellectual Property Filings: Insights from WIPO Report 2024

Syllabus Coverage

- **GS Paper II**: Governance and International Relations - Role of International Organizations.
- **GS Paper III**: Issues Related to Intellectual Property Rights (IPRs) and Innovation.

Context: **The** World Intellectual Property Organization (WIPO) **released its** World Intellectual Property Indicators 2024 Report**, highlighting India's remarkable growth in** intellectual property filings**. India's achievements in** patents, trademarks, and industrial design filings **reflect its growing innovation ecosystem.**

Key Findings Related to India

1. **Patents**

- India ranks **6th globally** with **64,500 patent filings**.
- **Patent-to-GDP ratio**: Increased from **144 in 2013** to **381 in 2023**.

2. **Trademarks**

- India's **IP office** is the **second highest globally** in trademark filings.
- Ranks **4th globally** in total trademark filings.

3. **Industrial Design Filings**

- India ranks **10th globally** with a **36% increase** in filings in 2023, reflecting growth in the creative sector.

Factors Behind the Surge in Patent Filings

1. **Government Initiatives and Policy Support**

- **Patents (Amendment) Rules, 2024**: Reduced **renewal fees** and simplified filing procedures.
- **National IPR Policy, 2016**: Strengthened the overall IPR ecosystem.

2. **Timely Clearance of Applications:** India granted **1.03 lakh patents** in the financial year 2023-24.

3. **Strengthened IP Infrastructure**

- Digitization of **patent filing processes**.
- Establishment of **IPR facilitation centers** to support applicants.

Challenges Related to Patents in India

1. **Abolition of Intellectual Property Appellate Board (IPAB):** Created a **void** in handling appeals and disputes in IP cases.
2. **Evergreening of Patents:** Tactics to extend patent periods, especially for **pharmaceutical drugs**, causing concerns about monopolies.
3. **Other Issues**

- **Compulsory Licensing**: Allows governments to license patents without the owner's consent in specific cases.
- **Procedural Delays**: Lack of fixed timelines for processing applications.

Regulation of Patents

1. **Global Framework**

- **World Intellectual Property Organization (WIPO)**: Oversees global IP practices.
- **WTO TRIPS Agreement, 1994**: Ensures minimum IP standards across member nations.
- Key Conventions:
  - **Patent Cooperation Treaty, 1970**: Simplifies international patent filing.
  - **Budapest Treaty, 1977**: Recognizes international deposits of microorganisms for patents.

2. **India's Legal Framework**

- **Indian Patents Act, 1970**: Governs patents in India.
- **Amendments in 2005**: Ensured compliance with **WTO TRIPS Agreement**, aligning Indian laws with global standards.

Significance of India's Growth in IPR Filings

1. **Boost to Innovation Ecosystem:** Reflects growing **research and development** efforts in India.
2. **Economic Growth:** Higher **patent-to-GDP ratio** indicates stronger integration of innovation with the economy.
3. **Global Recognition:** India's performance enhances its reputation as an **innovation-driven economy**.
4. **Encouragement to MSMEs and Startups:** Simplified processes and support encourage **startups** and **MSMEs** to protect their innovations.

Way Forward

1. **Reinstate Specialized Appellate Mechanisms:** Address the gap left by the abolition of **IPAB**.
2. **Streamline Procedures:** Introduce **fixed timelines** for processing patent applications to reduce delays.
3. **Address Evergreening Concerns:** Ensure robust mechanisms to prevent monopolistic practices in **pharmaceutical patents**.
4. **Awareness and Capacity Building**
   - Increase awareness among **startups, MSMEs**, and researchers about IPR filing processes.
   - Enhance **training programs** for officials and stakeholders.
5. **Strengthen IP Enforcement:** Improve **monitoring and enforcement** to address violations and ensure compliance with laws.

South China Sea Dispute: Strategic Importance and Ongoing Conflicts

Syllabus Coverage

- **GS Paper II**: International Relations – Bilateral, Regional, and Global Groupings.
- **GS Paper III**: Economic Resources and Security Issues.

Context

The **Philippines' Foreign Ministry** recently summoned **China's Ambassador** to protest against Beijing's declaration of baselines around the disputed **Scarborough Shoal**, intensifying tensions in the **South China Sea**.

South China Sea: Overview

Strategic Importance

1. **Natural Resources:** Contains an estimated **11 billion barrels of oil** and **190 trillion cubic feet of natural gas**.
2. **Economic Significance:** Major global shipping route, handling **30% of the world's trade**.
3. **Fishing Grounds:** Rich fishing zones crucial for the livelihoods of neighboring countries.

Key Areas of Dispute

1. Spratly Islands

- **Significance**: Strategic location, rich natural resources, and fertile fishing grounds.
- **Second Thomas Shoal**:
  - The Philippines grounded the **BRP Sierra Madre** to assert its territorial claims.
  - Site of frequent **China-Philippines clashes**, including **laser usage** and **water cannon incidents** by Chinese vessels.

2. Paracel Islands

- **Control**: Militarized by China with **fighter jets**, **missiles**, and **radar systems**.

- **Woody Island**: Key base for China's military installations in the region.

3. Scarborough Shoal

- **Names**: Known locally as **Panatag Shoal (Filipino)**, **Huangyan Island (Mandarin)**, and **Bajo de Masinloc (Spanish)**.
- **Claims**:
  - **Philippines**: Cites the **Treaty of Washington (1900)** and the **1734 Velarde map** as evidence.
  - **China**: Claims the region under its controversial **nine-dash line**.

South China Sea Claims and Stakeholders

1. **China**
   - Claims almost the entire sea under the **nine-dash line**.
   - Actively builds artificial islands and military installations.
2. **Philippines:** Relies on international law, including the **2016 Permanent Court of Arbitration ruling**, which invalidated China's claims.
3. **Other Claimants: Vietnam, Malaysia, Brunei, Taiwan, Indonesia**: Competing claims based on historical usage and exclusive economic zones (EEZs).

Key Incidents and Developments

1. **China-Philippines Clashes**
   - Frequent confrontations at **Second Thomas Shoal** and **Scarborough Shoal**.
   - Use of **lasers** and **water cannons** by Chinese vessels reported.
2. **Militarization by China:** Installation of military bases on **artificial islands** in the Paracel and Spratly groups.
3. **Legal Protests:** Philippines filed international protests against **China's actions**, citing the **UNCLOS framework**.

Significance of the Dispute

1. **Regional Security:** Tensions in the region have the potential to escalate into a broader **conflict**.
2. **Economic Impact:** Disruption of **global trade routes** can severely impact economies worldwide.
3. **Geopolitical Competition:** The dispute reflects **power struggles** between China, ASEAN nations, and external actors like the **USA**.
4. **Environmental Concerns:** Overfishing and **reef destruction** from artificial island construction harm biodiversity.

Way Forward

1. **Multilateral Engagement:** Strengthen ASEAN-led initiatives like the **Code of Conduct for the South China Sea** to resolve disputes peacefully.
2. **Legal Adherence:** Encourage adherence to **UNCLOS** and international arbitration rulings.
3. **Global Cooperation:** Involve external powers like the **USA**, **Japan**, and **India** in maintaining peace and ensuring freedom of navigation.
4. **Confidence-Building Measures:** Promote bilateral agreements for **resource sharing** and **joint patrols** to reduce confrontations.

First International Day Against Transnational Organized Crime

Syllabus Coverage

- **GS Paper II**: International Relations – Important international institutions, agencies, and their role in global issues.
- **GS Paper III**: Internal Security – Role of external state and non-state actors in creating challenges to internal security.

Context

The **United Nations General Assembly (UNGA)** declared **15th November** as the **International Day for the Prevention of and Fight Against All Forms of Transnational Organized Crime (TOC)** to strengthen international efforts in combating organized crime.

What is Transnational Organized Crime (TOC)?

- **Definition**: TOC refers to crimes orchestrated across national borders, involving groups that collaborate across multiple countries to plan and execute illegal activities.
- **Types of TOC**:
  - **Drug Trafficking**
  - **Human Trafficking**
  - **Migrant Smuggling**
  - **Money Laundering**
  - **Trafficking in Firearms**
  - **Counterfeit Goods**

Nexus Between Organized Crime and Terrorism

1. **Financing Terrorism**: Terrorist organizations receive funding through organized crime activities, including drug and arms trafficking.
   - **Example**: Militant groups in Northeast India act as couriers for illegal goods.
2. **Logistics and Safe Passage**: Criminal groups facilitate cross-border movement of terrorists.
   - **Example**: Southeast Asia's entry points like **Moreh** and **Cox's Bazaar** are key routes for smuggling.
3. **Counterfeit Currency**: Organized crime networks supply counterfeit currency to finance terrorism.
   - **Example**: Fake Indian currency notes circulated in Jammu & Kashmir.

Global Initiatives to Combat TOC

1. **United Nations Convention Against Transnational Organized Crime (2000)**: Also called the **Palermo Convention**, it is the primary international instrument for tackling organized crime.
2. **Financial Action Task Force (FATF)**: Establishes international standards to counter money laundering and terrorism financing.
3. **INTERPOL**: Coordinates global police efforts in combating TOC, with **196 member countries**.
4. **United Nations Office on Drugs and Crime (UNODC)**: Works to combat TOC, corruption, terrorism, and drug-related crimes.

India's Approach to Combating TOC

1. **Policy and Legal Framework**:

- Laws like **Unlawful Activities Prevention Act (UAPA)** address the nexus between terrorism and organized crime.
- The **Narcotic Drugs and Psychotropic Substances Act (NDPS)** combats drug trafficking.

2. **Enforcement Agencies**:
   - **National Investigation Agency (NIA)**: Focuses on terrorism and its organized crime linkages.
   - **Enforcement Directorate (ED)**: Tackles money laundering.
   - **Central Bureau of Investigation (CBI)**: Deals with economic and financial crimes.
3. **Border Management**: Strengthening border security with **Border Security Force (BSF)** and **Indo-Tibetan Border Police (ITBP)**to prevent smuggling and infiltration.
4. **International Cooperation**: Collaborates with INTERPOL and FATF to address transnational challenges.

Way Forward

1. **Strengthen International Cooperation**: Enhance information sharing and joint operations among nations.
2. **Capacity Building**: Train law enforcement agencies in handling sophisticated criminal networks.
3. **Legal Reforms**: Update domestic laws to align with international conventions on organized crime.
4. **Address Root Causes**: Focus on socio-economic issues that drive individuals into criminal networks.
5. **Technological Advancements**: Leverage AI, blockchain, and big data to track financial flows and identify organized crime networks.

DEFENCE & INTERNAL SECURITY

AFSPA Reimposed in Violence-Hit Areas of Manipur: Key Highlights and Concerns

Syllabus Coverage

- **GS Paper II**: Governance – Role of Security Forces and Agencies.
- **GS Paper III**: Security – Insurgency, Role of Armed Forces.

Context

The **Ministry of Home Affairs** has reimposed the **Armed Forces (Special Powers) Act (AFSPA), 1958**, in violence-affected areas of **Manipur**, including **Jiribam**, to restore law and order in the region.

About AFSPA, 1958

1. **Purpose:** Grants special powers to the armed forces in **"disturbed areas"** to maintain public order.
2. **Declaration of Disturbed Areas:** A **state/UT or part thereof** can be declared as a disturbed area by:
   - **Governor of the state**.
   - **Administrator of the UT**.
   - **Central Government**.
3. **Special Powers to Armed Forces**
   - Open fire against any person acting in violation of law after due warning.
   - Arrest individuals and search premises **without a warrant**.
4. **Immunity for Armed Forces Personnel**
   - **No legal proceedings** can be initiated against armed forces personnel without prior **sanction from the Central Government**.
5. **Treatment of Arrested Individuals**
   - The army must hand over arrested individuals to the **nearest police station** at the earliest.
6. **Current Applicability**
   - **Parts of Assam, Manipur, Nagaland, Arunachal Pradesh**.
   - In Jammu and Kashmir, the **Armed Forces (Jammu & Kashmir) Special Powers Act, 1990**, applies.

Supreme Court Judgments on AFSPA

1. **Naga People's Movement for Human Rights Case (1997):** Special powers under AFSPA, including the use of lethal force, must be exercised in **well-defined circumstances**.
2. **Extra Judicial Execution Victim Families Association Case (2016):** Armed forces are **not immune from investigation** for alleged excesses in disturbed areas.

Key Concerns About AFSPA

1. **Alleged Human Rights Violations:** Reports of **abuse of powers**, including extrajudicial killings, arbitrary arrests, **sexual violence**, and custodial deaths.
2. **Impunity:** Immunity from prosecution raises concerns about **accountability** and **justice**.
3. **Impact on Civilians:** Disruption of daily lives and trust deficit between **security forces** and **local populations**.

Committee Recommendations

1. **Justice B.P. Jeevan Reddy Committee (2004):** Recommended **repealing AFSPA**, stating it was **"highly unsatisfactory"**.
2. **Santosh Hegde Committee (2013):** Advocated for a **six-monthly review** of the Act's applicability in disturbed areas.
3. **Justice Verma Committee (2013):** Urged for **sexual violence** by armed forces to be brought under **regular criminal law**.

Arguments in Favor of AFSPA

1. **Counterinsurgency Tool:** Essential for tackling **insurgency** and maintaining **public order** in conflict zones.
2. **Security Forces' Protection:** Provides legal cover for armed forces personnel operating in hostile environments.
3. **Improved Law and Order:** Proven effective in restoring **peace** and **stability** in insurgency-prone regions.

Arguments Against AFSPA

1. **Erosion of Trust:** Excessive use of power has fueled **resentment** and **alienation** among local populations.
2. **International Criticism:** Violates **human rights standards**, inviting criticism from **global organizations** like the UN.
3. **Lack of Transparency:** Limited mechanisms to ensure **accountability** for misuse of powers.

Way Forward

1. **Review and Reform:** Conduct periodic reviews of the Act and its implementation.
2. **Strengthen Accountability Mechanisms:** Set up independent oversight committees to address allegations of abuse.
3. **Enhance Civil-Military Cooperation:** Build trust between armed forces and local communities through **community engagement programs**.
4. **Time-Bound Applicability:** Limit the duration of AFSPA's application to prevent prolonged misuse.
5. **Adopt Alternative Approaches:** Focus on **development**, **dialogue**, and **political solutions** to address insurgency and violence.

Rising Cyber Threats to India's Critical Information Infrastructure

Syllabus Coverage

- **GS Paper III**: Internal Security - Cyber Security and Challenges.

Context

The **Department of Personnel and Training (DoPT)** report highlights a surge in **ransomware attacks** targeting India's **Critical Information Infrastructure (CII)** in **2023**, posing significant threats to national security, economy, and public safety.

Key Findings from the Report

1. **Types of Cyber-Attacks**
   - **Malware Attacks**: E.g., a ministry's system breach.
   - **Data Breaches**: Compromised sensitive information from public and private institutions.
   - **DDOS Attacks**: Massive **Distributed Denial-of-Service (DDOS)** attacks disrupted critical infrastructure, including airports.
2. **Overall Cybersecurity Landscape in India**
   - **2023 Incidents**: ~1.6 million security incidents reported.
   - **Comparison**: Marked rise from ~53,000 incidents in 2017 (CERT-IN data).

What is Critical Information Infrastructure (CII)?

1. **Definition**

- **Section 70 of IT Act, 2000** defines CII as **computer resources** whose destruction or incapacitation would have a debilitating impact on:
  - **National security**.
  - **Economy**.
  - **Public health or safety**.

2. **Examples**

- **Banking and Financial Systems**.
- **Transportation Systems** (Airports, Railways).
- **Water Supply and Utilities**.
- **Mobile and Communication Networks**.
- **Defense and Nuclear Facilities**.

Notable Cyber-Attacks on CII in India

1. **AIIMS Ransomware Attack (2023):** Disrupted healthcare services and compromised sensitive patient data.
2. **Kudankulam Nuclear Power Plant Cyberattack (2019):** Attempted breach of critical nuclear facility systems.
3. **ICMR Data Breach (2023):** Exposed critical health research data.

Reasons Behind India's Vulnerability

1. **Budget Constraints:** Insufficient allocation for **cybersecurity enhancements**.
2. **Third-Party Dependencies:** Over-reliance on external vendors for critical services.

3. **Monitoring Challenges:** Difficulty in ensuring **real-time threat detection** and continuous system monitoring.
4. **Shortage of Cybersecurity Professionals:** Lack of adequately trained **specialized personnel** to address cyber threats.

Steps Taken for Protecting Critical Information Infrastructure

1. **National Security Council Secretariat:** Provides **strategic direction** and coordinates overall cybersecurity efforts.
2. **National Critical Information Infrastructure Protection Centre (NCIIPC):** Dedicated to protecting India's CII from cyber threats.
3. **Indian Cyber Crime Coordination Centre (I4C):** Framework for law enforcement agencies to tackle cybercrimes effectively.
4. **Other Initiatives**
   - **Cyber Surakshit Bharat Initiative**: Enhances awareness and preparedness for cybersecurity.
   - **Defence Cyber Agency (DCyA)**: Focuses on protecting the armed forces' cyber assets.

Way Forward

1. **Budget Augmentation:** Increase funding for **cybersecurity infrastructure** and training programs.
2. **Advanced Threat Detection Systems:** Deploy **AI-driven threat monitoring** for real-time detection and mitigation of cyber threats.
3. **Skill Development:** Establish dedicated training programs to create a pool of **specialized cybersecurity professionals**.
4. **Collaborative Frameworks:** Strengthen partnerships between **public and private sectors** for sharing threat intelligence.
5. **Legislation and Regulation:** Update laws to enforce stricter penalties for cybercrimes and enhance protection protocols for CII.

India's Adaptive Defence Strategy: Preparing for Emerging Challenges

Syllabus Coverage- GS Paper III: Internal Security - Challenges to National Security and Role of Emerging Technologies.

Context

At the **Delhi Defence Dialogue**, **Raksha Mantri** emphasized the need for **'Adaptive Defence'** to address evolving threats shaped by emerging technologies, changing warfare paradigms, and complex strategic dynamics.

What is Adaptive Defence?

Definition: A **strategic approach** where a nation's military and defence mechanisms **continuously evolve** to counter **emerging threats** effectively.

Principles of Adaptive Defence

1. **Proactive Threat Anticipation**: Stay ahead by predicting potential challenges.
2. **Flexibility and Agility**: Adapt strategies and tactics to unpredictable situations.
3. **Innovation**: Integrate cutting-edge technologies into defence systems.
4. **Resilience**: Build enduring systems to withstand multi-domain threats.

Capabilities Required for Adaptive Defence

1. **Situational Awareness:** Real-time monitoring and analysis of emerging security threats.
2. **Flexibility at Strategic and Tactical Levels:** Ability to modify operational plans swiftly.
3. **Technological Integration:** Adoption of **AI**, **cybersecurity**, **robotics**, and **advanced weaponry**.
4. **Resilience and Agility:** Develop robust systems capable of responding to both **traditional** and **non-traditional threats**.
5. **Collaboration:** Foster integration across **military branches**, **government departments**, and **international allies**.

Significance of Adaptive Defence

1. **Securing National Interests:** Ensures preparedness beyond **border protection**, addressing **space security**, **cyber threats**, and **supply chain resilience**.
2. **Countering Non-Traditional Challenges:** Addresses threats like **drug trafficking**, **terrorism**, and **bio-crimes**.
3. **Mitigating Information Warfare (IW):** Enhances capability to counter **propaganda**, **cyberattacks**, and other networked operations.
4. **Future-Proofing Defence:** Prepares the military for **unpredictable technological advancements** and new warfare domains.

Emerging Technologies Shaping Future Warfare

1. **Information Warfare (IW):** Operations targeting networked systems to gain an **information advantage** over adversaries.
    - **Example**: Cyberwarfare, psychological operations.
2. **Lethal Autonomous Weapon Systems (LAWS):** Fully automated weapons capable of **engaging targets without human intervention**.
3. **Advanced Weaponry: Lasers and Railguns**: For **space-based attacks** and neutralizing satellites.
4. **Synthetic Biology:** Emerging threats like:
    - **Illegal gene-editing**.
    - **Bio-malware** and **bio-hacking** for targeted biological attacks.

Way Forward for India's Adaptive Defence

1. **Strengthening Technological Edge:** Invest in **indigenous R&D** for AI, robotics, and quantum technologies.
2. **Building Resilient Systems:** Enhance **cyber defence** and ensure redundancy in critical systems.
3. **Modernizing Military Infrastructure:** Equip the armed forces with **smart and autonomous systems** for multi-domain warfare.
4. **Collaborative Defence Strategies:** Strengthen **bilateral and multilateral ties** to address transnational threats.
5. **Capacity Building:** Train personnel to operate **next-generation technologies** and develop adaptive strategies.

ECONOMY

Formalization of the Economy: Driving Inclusive Growth in India

Syllabus Coverage

- **GS Paper III**: Indian Economy – Inclusive Growth, Employment, and Economic Development.
- **GS Paper II**: Welfare Schemes and Governance.

Context

India is undergoing a significant economic transformation, moving from informality to formality. This shift ensures **employment security**, **social benefits**, and **economic stability**, improving workers' quality of life and fostering equitable growth. Institutions like the **Employees' Provident Fund Organisation (EPFO)** and government initiatives are key drivers of this formalization.

What is Formalization of the Economy?

Definition: Formalization refers to transitioning economic activities from the **informal sector** (unregistered businesses, daily-wage workers) to the **formal sector**, where employment and operations comply with legal and regulatory frameworks.

Features of a Formal Economy

1. **Legal Protections**: Job contracts ensure security and workers' rights.
2. **Social Security**: Access to benefits like **retirement funds**, **health insurance**, and **pension schemes**.
3. **Stable Income**: Fixed and regulated salaries through official payment channels.
4. **Transparency**: Compliance with tax and labor laws promotes accountability.
5. **Access to Financial Services**: Easier credit access, enabling economic growth.

EPFO: A Key Driver of Formalization

The **Employees' Provident Fund Organisation (EPFO)** is pivotal in formalizing India's workforce. It manages **long-term savings** and **social security** for salaried employees.

Benefits of EPFO

1. **Retirement Security**: Ensures financial independence post-retirement.
2. **Insurance Coverage**: Under **Employees' Deposit Linked Insurance (EDLI)** scheme.
3. **Pension Benefits**: Regular income through the **Employees' Pension Scheme (EPS)**.
4. **Emergency Support**: Partial withdrawals for medical, education, or housing needs.
5. **Legal Safeguards**: EPFO membership signifies employer compliance with labor laws.

Impact of EPFO on Formalization

- **Registrations Reflect Growth**:
  - From **2017 to 2024**, **6.91 crore members** joined EPFO.
  - In **2022-23**, **1.38 crore new registrations** were recorded.
  - **July 2024** saw a record **20 lakh registrations**, showcasing labor market dynamism.
- **Inclusivity**: Rising participation of **youth**, **women**, and **job-switching employees** highlights increased formalization.

Government Schemes Supporting Formalization

1. **Pradhan Mantri Rojgar Protsahan Yojana (PMRPY)**: Encourages formal employment by contributing to employers' **EPF payments** for three years.
2. **Aatmanirbhar Bharat Rozgar Yojana (ABRY)**: Incentivizes job creation by reimbursing employers for **EPF contributions** during COVID-19 recovery.
3. **PM SVANidhi Scheme**: Integrates street vendors into the formal economy by providing **affordable loans** for business expansion.

Challenges in Formalization

1. **Increased Operational Costs**: Small businesses face higher compliance costs for adhering to labor laws.
2. **Credit Access Barriers**: MSMEs often lack formal documentation to secure loans.
3. **Bureaucratic Hurdles**: Lengthy registration and compliance processes deter informal businesses.
4. **Worker Displacement**: Informal workers risk losing jobs as employers adjust to formal regulations.
5. **Economic Vulnerability**: Policies like **GST** and **demonetization** disproportionately impact informal workers without adequate safeguards.

Way Ahead

1. **Simplify Regulatory Processes**: Introduce **single-window clearance** and user-friendly platforms for business registration.
2. **Expand Credit Access**: Provide **collateral-free loans** and support mechanisms tailored for MSMEs.
3. **Support Informal Workers**: Establish **self-help groups (SHGs)** for collective bargaining and access to social security benefits.
4. **Comprehensive Data Collection**: Develop a **robust statistical framework** to monitor informal sector dynamics and design targeted policies.
5. **Infrastructure Development**: Provide public amenities like **workspace**, **waste collection**, and **water supply** to improve productivity and accountability.

RBI & SEBI Issue Framework for Reclassification of FPI to FDI

Syllabus Coverage- GS Paper III: Economy - Foreign Investment, Regulatory Bodies, and Governance.

Context

The **Reserve Bank of India (RBI)** and the **Securities and Exchange Board of India (SEBI)** have issued a new operational framework to facilitate the **reclassification of Foreign Portfolio Investment (FPI) to Foreign Direct Investment (FDI)**. This move aims to attract **foreign capital**, ensure compliance with FDI regulations, and enhance transparency.

Key Highlights of the Framework

1. Current FPI Limitations

- FPIs can hold a maximum of **10%** of a company's **paid-up equity capital**.
- Exceeding this limit previously left FPIs with two options:
  - **Divesting** the excess shares.
  - Reclassifying the investment as **FDI**.

2. New RBI Operational Framework

1. **Prohibited Sectors**

- Reclassification of FPI to FDI is **not allowed** in sectors where **FDI is prohibited**, such as **chit funds**, **gambling**, and others.

2. **Government Approvals**
   - FPIs from **land-bordering countries** must obtain prior **government approvals** before reclassification.
   - The reclassification requires **concurrence of the Indian investee company**.
3. **Compliance with FDI Regulations**
   - Investments must adhere to:
     - **Entry routes**: Automatic or government.
     - **Sectoral caps**: Limits on foreign equity participation.
     - **Pricing guidelines**: Valuation norms for share acquisition.
     - Other **conditions specified under FDI rules**.
4. **Guiding Regulations**
   - Reclassification is governed by the **Foreign Exchange Management (Mode of Payment and Reporting of Non-Debt Instruments) Regulations, 2019**.

Significance of the Framework

1. **Flexibility for Investors:** Allows FPIs to transition to a **more strategic investment**, aligning with long-term interests.
2. **Attracting Foreign Capital:** Facilitates **greater foreign investment** by easing the process of transitioning from portfolio to direct investment.
3. **Clarity and Transparency:** Provides **clear operational guidelines**, improving investor confidence in the Indian market.
4. **Enhanced Strategic Investment:** Encourages **long-term, stable capital flows**, supporting India's economic growth.

About Foreign Direct Investment (FDI)

1. **Definition**
   - FDI involves a **foreign investor acquiring a stake** in an Indian company or project, often with a **long-term investment perspective**.
   - It is largely a **non-debt creating capital flow**, promoting sustainable growth.
2. **FDI Approval Routes**
   - **Automatic Route**: Investments that **do not require government approval**.
   - **Government Route**: Proposals requiring approval from the respective **Administrative Ministry/Department**.

Way Forward

1. **Streamlining Approval Processes:** Simplify government approvals for FPIs transitioning to FDIs in sensitive sectors.
2. **Ensuring Compliance:** Strengthen **monitoring mechanisms** to ensure adherence to FDI entry routes and sectoral caps.
3. **Promoting Awareness:** Conduct **outreach programs** for foreign investors to familiarize them with the reclassification framework.
4. **Fostering Long-Term Investment:** Encourage strategic partnerships between foreign investors and Indian companies to promote **sustainable economic growth**.

Domestic Systemically Important Banks (D-SIBs): The Backbone of India's Financial System

Syllabus Coverage- GS Paper III: Indian Economy – Banking Sector and Financial Stability.

Context

The **Reserve Bank of India (RBI)** has retained **State Bank of India (SBI)**, **HDFC Bank**, and **ICICI Bank** as **Domestic Systemically Important Banks (D-SIBs)** for 2024, reaffirming their critical role in maintaining financial stability.

What are Domestic Systemically Important Banks (D-SIBs)?

1. **Definition**
   - D-SIBs are banks classified as **"Too Big To Fail (TBTF)"** due to their **size**, **interconnectedness**, and critical role in the economy.
   - The failure of a D-SIB could disrupt the financial system and cause significant economic instability.
2. **RBI Framework**
   - Introduced in **2014** to identify and manage D-SIBs.

D-SIBs in India

1. **Identified Banks**
   - **SBI**: Identified as D-SIB in **2015**.
   - **ICICI Bank**: Added in **2016**.
   - **HDFC Bank**: Included in **2017**.
2. **Current Classification (2024)**
   - **SBI**: Bucket 4 (Highest systemic importance).
   - **HDFC Bank**: Bucket 3.
   - **ICICI Bank**: Bucket 1.

Why are D-SIBs Important?

1. **Prevent Systemic Risk**
   - Ensures that essential banking services remain **uninterrupted**, reducing the impact of a potential failure.
2. **Promote Financial Stability**
   - Strengthens the banking system through **additional capital requirements** and **enhanced regulatory oversight**.
3. **Reduce Moral Hazard**
   - Discourages risky behavior by imposing **higher capital surcharges** on large banks.

Capital Requirements for D-SIBs

1. **Additional Common Equity Tier 1 (CET1)**
   - SBI: **0.80%** of Risk-Weighted Assets (RWAs).
   - HDFC Bank: **0.40%** of RWAs.
   - ICICI Bank: **0.20%** of RWAs.
2. **Implementation Timeline**
   - Higher surcharges will be applicable from **April 1, 2025**.

Selection Criteria for D-SIBs

1. **Size Threshold**
   - Banks with **size >2% of GDP** are assessed.
2. **Composite Score Calculation**
   - Based on factors like:
     - **Size**.
     - **Cross-jurisdictional activity**.
     - **Complexity**.
     - **Substitutability**.
     - **Interconnectedness**.
3. **Threshold Score**
   - Banks scoring above the threshold are classified as **D-SIBs**.

Global Systemically Important Banks (G-SIBs)

1. **Identification**
   - Managed by the **Financial Stability Board (FSB)** in consultation with the **Basel Committee on Banking Supervision (BCBS)**.
2. **2023 G-SIBs**
   - Includes **JP Morgan Chase**, **HSBC**, **Bank of China**, **BNP Paribas**, among others.

Significance of D-SIB Classification

1. **Enhances Market Confidence**
   - Assures stakeholders of the stability and resilience of the identified banks.
2. **Strengthens Risk Management**
   - Higher capital buffers reduce vulnerabilities to **financial shocks**.
3. **Ensures Continuity of Operations**
   - Prevents disruptions in critical banking services during times of economic distress.
4. **Global Alignment**
   - Aligns India's banking sector with **global regulatory frameworks** like those for **G-SIBs**.

Way Forward

1. **Strengthening Oversight**
   - Improve **risk assessment frameworks** for monitoring D-SIBs' performance and resilience.
2. **Encouraging Prudence**
   - D-SIBs should adopt conservative lending and investment practices to mitigate systemic risks.
3. **Enhancing Capital Reserves**
   - Encourage D-SIBs to voluntarily maintain capital buffers above regulatory requirements.
4. **Regional Integration**
   - Coordinate with global bodies like the **FSB** to ensure **cross-border stability** in financial systems.

Managing the Challenges of Declining Population in India

Syllabus Coverage

- **GS Paper I**: Population and Associated Issues.
- **GS Paper II**: Governance and Policy Interventions in Health and Social Security.
- **GS Paper III**: Economic Development and Challenges in Labour Market.

Context

India is undergoing a **demographic shift**, characterized by declining fertility rates and an ageing population, particularly in southern states like Kerala and Tamil Nadu. This transition poses significant **socio-economic, political, and federal challenges**. Policymakers are exploring ways to balance the benefits and mitigate the risks of this demographic change, which will shape India's future growth trajectory.

Present Demographic Trends in India

1. **Declining Fertility Rates**

- **National average**: 2.0 (below the replacement level of 2.1).
- **Southern states**: Fertility rates in Tamil Nadu and Kerala range from 1.4 to 1.5.
- **Northern states**: Fertility rates remain above 2.5 in Bihar and Uttar Pradesh.

2. **Rising Ageing Population**

- **Current trends**: Senior citizens made up 10.1% of the population in 2021.
- **Projections**: By 2036, this will rise to 15% (UNFPA).
- States like **Kerala** may see 22.8% of their population classified as elderly by 2036.

3. **Old-Age Dependency Ratios**

- Southern states like Kerala (26.1%) and Tamil Nadu (20.5%) show higher old-age dependency compared to Bihar (7.7%).
- This indicates a greater burden on the working-age population to support the elderly.

Impacts of a Declining Population

Positive Impacts

1. **Reduced Pressure on Resources**:
    - Slower growth eases demand for infrastructure, energy, and natural resources.
    - Per capita resource availability improves, leading to **higher living standards**.
2. **Environmental Gains**: Reduced demand for land, water, and energy results in a **lower ecological footprint**.

Negative Impacts

1. **Economic Slowdown**:
    - A declining **working-age population** reduces overall productivity and GDP growth.
    - Sectors like **education, entertainment, and sports** face reduced demand.
2. **Federal Structure Challenges**:
    - Unequal population growth threatens to disrupt India’s federal framework.
    - **Parliamentary seat redistribution** in 2026 may favor high-growth states like Uttar Pradesh and Bihar, leading to political and regional imbalances.
3. **Healthcare and Social Security Strains**:
    - **Rising geriatric care costs** and healthcare demands increase.
    - Fewer workers contribute to pension systems, straining public finances.
4. **Labour Shortages**:
    - Shrinking workforce impacts industries, agriculture, and the services sector.
5. **Geopolitical Risks**:
    - A reduced youth population could weaken **national defense capabilities**, posing **security risks**.

Case Studies

1. **India's Federal Challenges**:
    - **Seat Redistribution Study**:
        - Uttar Pradesh: Likely to gain 12 seats.
        - Bihar: Likely to gain 10 seats.
        - Tamil Nadu: Set to lose 9 seats.
        - Kerala: Predicted to lose 6 seats.
    - This redistribution reflects falling shares of southern states in the national population.
2. **Japan's Demographic Crisis**:
    - Japan faces over **9 million vacant homes** due to ageing and low birth rates.
    - Urban decay has spread to cities like Tokyo, threatening economic vibrancy.
    - This highlights the risks of demographic decline for global economies.

Way Forward

1. **Pro-Natalist Policies with Caution**

- Incentivize childbearing through **gender-equitable measures** like:
    - Parental leave.
    - Affordable childcare.
    - Flexible work arrangements.

2. **Utilize Migration to Balance Population:** Attract **economic migrants** to fill workforce gaps and meet labour demands.

3. **Extend Working Life:** Introduce policies for **delayed retirement** and **reskilling older workers**.

4. **Strengthen Social Security Systems:** Develop robust **pension schemes** and efficient healthcare systems to support the ageing population.

5. **Adopt Technology for Productivity**

- Invest in **automation**, **AI**, and **robotics** to overcome labour shortages.
- Promote **technology-driven innovation** to enhance efficiency.

India's Renewable Energy Milestones: October 2023 to October 2024

Syllabus Coverage- GS Paper III: Infrastructure - Energy, Environment, and Renewable Energy.

Context

India's renewable energy sector witnessed remarkable progress between **October 2023 and October 2024**, with significant capacity additions across **solar**, **wind**, **hydro**, and **nuclear energy**, reaffirming its commitment to sustainable energy goals.

Achievements in Renewable Energy

1. Total Renewable Energy Capacity: Increased by **24.2 GW** (**13.5% growth**) to reach **203.18 GW** in October 2024, up from **178.98 GW** in October 2023.

2. Non-Fossil Fuel Capacity: Total capacity, including nuclear energy, rose to **211.36 GW** in 2024, up from **186.46 GW** in 2023.

Breakdown of Achievements

1. Solar Power

- **Capacity Growth**: Added **20.1 GW** (**27.9% growth**) to reach **92.12 GW** in October 2024, up from **72.02 GW** in October 2023.
- **Pipeline Projects**: Total solar capacity under implementation and tendered reached **250.57 GW**, up from **166.49 GW** last year.

2. Wind Power

- **Installed Capacity**: Grew by **7.8%**, reaching **47.72 GW** in 2024, up from **44.29 GW** in 2023.
- **Pipeline Projects**: Total capacity under development for wind energy expanded to **72.35 GW**.

3. Hydro and Nuclear Energy

- **Large Hydro**: Contributes **46.93 GW** to the renewable energy mix.
- **Nuclear Power**: Adds **8.18 GW** as of October 2024.

Capacity Additions (April-October 2024)

1. **Renewable Capacity:** Added **12.6 GW**, with **1.72 GW** installed in October 2024 alone.
2. **Projects Under Implementation:** Expanded to **143.94 GW**, up from **99.08 GW** in 2023.
3. **Tendered Projects:** Increased to **89.69 GW**, compared to **55.13 GW** in 2023.

Key Implications of Achievements

1. Contribution to Global Climate Goals: Strengthens India's role in meeting its **Nationally Determined Contributions (NDCs)** under the Paris Agreement.

2. Energy Security: Enhances India's shift toward **energy independence**, reducing reliance on fossil fuels.

3. Boost to Green Economy: Drives growth in the **green jobs sector**, especially in solar and wind energy industries.

4. Alignment with Net-Zero Goals: Supports India's target of achieving **net-zero emissions by 2070**.

Way Forward

1. **Accelerate Project Execution:** Expedite implementation of tendered projects to bridge the gap between planned and operational capacity.
2. **Expand Grid Infrastructure:** Strengthen grid integration to handle increasing renewable energy contributions.
3. **Innovative Financing:** Attract global and domestic investments for large-scale renewable projects.
4. **Technological Advancements:** Invest in **storage technologies**, such as **battery storage** and **pumped hydro**, to address intermittency issues.
5. **Focus on Offshore Wind Energy:** Expand offshore wind potential to complement onshore renewable initiatives.

Report on Municipal Finances: Trends and Insights

Syllabus Coverage

- **GS Paper II**: Urban Local Governance – Financial Issues and Management.
- **GS Paper III**: Economic Development – Fiscal Policy and Public Finance.

Context

The **Report on Municipal Finances**, analyzing data from **232 municipal corporations**, highlights significant improvements in fiscal health and expenditure trends between **2019-20 and 2023-24**.

Key Findings on Municipal Finances

1. Revenue Composition (FY24 Estimates)

1. **Own Sources**
   - Taxes, fees, and user charges constitute **50%** of total revenue.
2. **Revenue Grants**
   - Transfers from **Central and State governments** make up **25%**.
3. **Other Sources**
   - Includes **rentals**, **compensations**, and **investments**, contributing the remaining **25%**.

2. Short-Term Revenue Trends (FY20 vs. FY24)

1. **Increase in Own Sources**
   - Share of **own taxes** increased from **27.3%** to **30%**.
   - Share of **fees and user charges** rose from **18.7%** to **20.2%**.
2. **Decline in Revenue Grants**
   - Dropped from **27.9%** to **24.9%**, indicating reduced dependence on higher tiers of government.

3. State Performance (FY24)

1. **Highest Own Tax Revenue**
   - Top-performing states:
     - **Karnataka**: 53.8%.
     - **Telangana**: 50.3%.
     - **Tamil Nadu**: 44.3%.
     - **Jharkhand**: 44.0%.
2. **Lowest Own Tax Revenue**
   - Underperforming states:
     - **Rajasthan**, **Odisha**, and **Uttarakhand**.

4. Expenditure Trends

1. **Capital Expenditure:** Increased from **56.1%** (FY20) to **61.5%** (FY24), reflecting greater focus on **infrastructure development**.
2. **Revenue Expenditure:** Decreased from **43.9%** (FY20) to **38.5%** (FY24), suggesting improved **efficiency in operational spending**.

Significance of Findings

1. **Improved Self-Reliance:** Growth in **own revenue sources** signifies enhanced fiscal autonomy and reduced dependence on external grants.
2. **Focus on Infrastructure:** Higher capital expenditure underscores priorities on **urban infrastructure**, improving services like water supply, transport, and sanitation.
3. **Regional Variations:** Wide disparities in **tax revenue mobilization** highlight the need for tailored interventions to support weaker municipalities.
4. **Efficiency Gains:** Reduction in revenue expenditure indicates better cost management and resource allocation.

Challenges in Municipal Finances

1. **Revenue Generation Limitations:** Many municipal corporations lack robust mechanisms for tax collection and user fee implementation.
2. **Dependence on Grants:** Despite improvements, a significant share of revenue still depends on **state and central transfers**.
3. **Disparities Across States:** Poor fiscal performance in some states undermines national-level progress in urban governance.
4. **Capacity Constraints:** Limited administrative and technical capacity hampers effective utilization of funds, particularly for capital projects.

Way Forward

1. **Strengthen Revenue Sources**
   - Improve **property tax systems** through digitization and better valuation mechanisms.
   - Expand **user charges** for services like water, waste management, and public transport.
2. **Increase Financial Accountability**
   - Ensure transparency in **budgeting and expenditure tracking**.
   - Mandate periodic audits for financial performance assessments.
3. **Support Lagging States:** Provide **technical assistance** and **capacity-building programs** for underperforming municipalities.
4. **Promote Public-Private Partnerships (PPPs):** Leverage private investments for infrastructure development to reduce fiscal burden.
5. **Integrated Urban Planning:** Align municipal finances with broader urban development goals under missions like **AMRUT** and **Smart Cities Mission**.

Insights from RBI's Report on Municipal Finances: Challenges and Recommendations

Syllabus Coverage

- **GS Paper II**: Governance – Local Self-Government and Urban Governance.
- **GS Paper III**: Economic Development – Public Finance, Financial Reforms.

Context

The **Reserve Bank of India (RBI)** released its **Report on Municipal Finances 2024**, analyzing the financial performance of **Municipal Corporations (MCs)** and providing recommendations to enhance their fiscal health and autonomy.

Key Findings of the Report

1. **Low Revenue Collection**
   - **Municipal revenue** contributes only **0.6% of GDP (2023-24)**, compared to:
     - **Central Government**: 9.2% of GDP.
     - **State Governments**: 14.6% of GDP.
2. **Dependence on Transfers**
   - Heavy reliance on grants:
     - **Central Government Grants**: Increased by **24.9% (2022-23)**.
     - **State Government Grants**: Increased by **20.4% (2022-23)**.
3. **Rising Borrowings**
   - **Municipal borrowings** surged from **₹2,886 crore (2019-20)** to **₹13,364 crore (2023-24)**.

- **Bonds**:
  - Total: ₹4,204 crore, representing **0.09% of corporate bonds**.
  - Most bonds are **privately placed**, indicating underdeveloped municipal bond markets.

Challenges in Municipal Finances

1. **Revenue Deficit**
   - Municipal revenue collection lags significantly compared to advanced economies.
2. **Underdeveloped Bond Market**
   - Limited adoption of municipal bonds or **green bonds** for infrastructure development.
3. **Low Operational Flexibility**
   - Lack of autonomy in decision-making and revenue generation.
4. **Inefficiency in Revenue Collection**
   - Property taxes and user charges are underutilized due to poor implementation and lack of digitization.

Revenue Sources of Urban Local Bodies (ULBs)

1. Own Sources

- **Tax Revenue**:
  - Property tax, water benefit tax, advertisement tax.
- **Non-Tax Revenue**:
  - User charges (water supply, waste management), development fees.
- **Other Receipts**:
  - Lease rent, fines, sale of scrap.

2. Assigned Revenue: Shared taxes like **entertainment tax** (subsumed under GST except when levied by local bodies) and **professional tax**.

3. Grants-in-Aid

- Central Finance Commission (CFC) and State Finance Commission (SFC) devolutions.
- Program-specific grants (e.g., **Swachh Bharat Mission (SBM)**, **AMRUT**).

4. Borrowings: Loans from central and state governments, banks, and financial institutions.

Recommendations

1. **Enhancing Revenue Sources**
   - **Reform Property Tax**:
     - Use **GIS mapping** for better property identification and valuation.
   - **Rationalize User Charges**:
     - Charge adequately for water, waste management, and parking.
2. **Improving Financial Transfers**
   - Strengthen **State Finance Commissions (SFCs)** for timely and predictable transfers to ULBs.
3. **Cost Efficiency**
   - Digitize municipal operations to reduce costs.
   - Utilize **Public Private Partnerships (PPPs)** in areas like:
     - **Urban transport**, **waste management**, and **renewable energy**.
4. **Innovative Financing**
   - Explore **municipal bonds** and **green bonds** for infrastructure projects.
   - Smaller municipalities should aggregate projects to attract investors.
5. **Financial Transparency**
   - Adopt practices like the **National Municipal Accounting Manual** for standardized reporting and accountability.

Significance of Reforming Municipal Finances

1. **Strengthening Urban Governance:** Financially robust municipalities can better perform their statutory functions.
2. **Better Infrastructure Development:** Enhanced revenue collection and innovative financing enable long-term infrastructure investments.
3. **Decentralization:** Improved financial health reduces reliance on state and central transfers, promoting autonomy.
4. **Achievement of Urban Missions:** Programs like **Smart Cities Mission** and **AMRUT** can be better implemented with financially empowered ULBs.

India's Cooperative Movement: Empowering Rural and Inclusive Development

Syllabus Coverage

- **GS Paper II**: Governance, Social Justice, and Welfare Policies.
- **GS Paper III**: Inclusive Growth, Agriculture, and Economic Development.

Context

India's cooperative movement, guided by the principle of **"Vasudhaiva Kutumbakam" (the world is one family)**, has been instrumental in fostering inclusive growth, rural development, and socio-economic empowerment. The recent initiatives by the Ministry of Cooperation aim to modernize and strengthen this grassroots movement.

What are Cooperative Societies?

- **Definition**: Voluntary organizations where individuals with shared interests pool resources to achieve common goals.
- **Core Principles**:
  - **Self-help** and **mutual assistance**.
  - Focus on **community welfare** over profit.
- **Benefits**: Collective resource utilization and shared benefits for members.

Types of Cooperatives in India

1. **Consumers' Cooperative Societies**
   - **Role**: Provide goods at reasonable prices by bypassing middlemen.
   - **Examples**: **Kendriya Bhandar**, **Apna Bazar**.
2. **Producers' Cooperative Societies**
   - **Role**: Support small producers by providing raw materials and resources.
   - **Examples**: **Haryana Handloom**, **APPCO**.
3. **Marketing Cooperative Societies**
   - **Role**: Enable collective marketing for small producers.
   - **Example**: **AMUL**.
4. **Credit Cooperative Societies**
   - **Role**: Offer financial assistance at affordable interest rates.
   - **Examples**: **Urban Cooperative Banks**, **Village Service Cooperative Societies**.
5. **Farming Cooperative Societies**
   - **Role**: Facilitate large-scale farming benefits for small farmers.
   - **Examples**: **Lift-Irrigation Cooperatives**.

6. **Housing Cooperative Societies**
    - **Role**: Provide affordable housing through resource pooling.
    - **Examples**: **Employees' Housing Societies**.

Evolution of the Cooperative Movement

Pre-Independence Era

1. **1904**: Cooperative Credit Societies Act—legalized cooperatives but limited scope to credit societies.
2. **1912**: Cooperative Societies Act—expanded to include marketing and artisan cooperatives.
3. **1925**: Bombay Cooperative Society Act—first provincial cooperative legislation.
4. **1942**: Multi-Unit Cooperative Societies Act—regulated inter-provincial cooperatives.

Post-Independence Era

1. **Integration in Five-Year Plans**: Emphasized economic decentralization and social justice.
2. **1963**: Establishment of the **National Cooperative Development Corporation (NCDC)**.
3. **1982**: Formation of **NABARD** for cooperative financing.
4. **2002**: National Policy on Cooperatives introduced a unified legal framework.
5. **2023**: MSCS Amendment Act improved governance and transparency in cooperatives.

Resurgence of the Cooperative Movement

Key Government Initiatives by the Ministry of Cooperation

1. **Model Bye-Laws for PACS**: Diversification of activities, adopted by 32 states.
2. **Computerization of PACS**: ₹2,516 crore project covering **63,000 societies**.
3. **Decentralized Grain Storage Plan**: Reduces food grain wastage at PACS levels.
4. **PACS as Common Service Centers**: Offer **300+ e-services** to rural citizens.
5. **PM Bhartiya Jan Aushadhi Kendras**: 2,475 PACS approved for selling generic medicines.

Significance of Cooperatives in India

1. **Economic Empowerment**
    - Provide **affordable credit** and **financial inclusion** for marginalized groups.
    - Support livelihoods through collective farming and marketing.
2. **Social Equity**
    - Bridge **socio-economic disparities** by empowering weaker sections.
    - Promote **women's welfare** and community development.
3. **Sectoral Presence**
    - **Agriculture**: Fertilizers, marketing, and storage.
    - **Finance**: Credit and banking services through cooperatives.
    - **Dairy**: Successful models like **AMUL** demonstrate cooperatives' impact.
4. **Grassroots Governance**
    - Decentralized decision-making strengthens democracy and local governance.

Challenges in the Cooperative Sector

1. **Governance Issues:** Political interference and mismanagement weaken cooperatives.
2. **Operational Inefficiencies:** Lack of professional expertise in cooperative management.
3. **Financial Constraints:** Limited access to capital for expanding activities.
4. **Technological Gaps:** Slow adoption of digital technologies in rural cooperatives.

Way Forward

1. **Capacity Building**: Training for cooperative management and governance.
2. **Financial Support**: Expand financial aid and promote self-sufficiency through innovative funding models.
3. **Technology Integration**: Leverage digital tools for efficient operations and service delivery.
4. **Policy Reforms**: Strengthen legal frameworks to prevent misuse and ensure transparency.
5. **Community Participation**: Involve members in decision-making and implementation for ownership and accountability.

World Energy Employment Report

Syllabus Coverage- GS Paper III: Economy – Employment; Environment – Energy Sector.

Context

The **International Energy Agency (IEA)** released the **World Energy Employment 2024 Report**, showcasing trends in global energy job creation, particularly emphasizing clean energy's role in driving employment growth.

Key Findings of the Report

Global Trends

- **Energy Employment Growth**: Outperformed broader labor markets in 2023.
- **Clean Energy**: The primary driver of job creation, surpassing traditional fossil fuel sectors.
- **Regional Highlights**:
  - Developed economies see increasing investments in renewable energy.
  - Developing economies like India and Brazil show potential for large-scale clean energy job growth.

India-Specific Findings

- **Employment in Energy Sector**:
  - Accounts for **8.5 million jobs** (~1.5% of total employment).
  - Majority workforce in the **informal sector**.
- **Clean Energy Sector**: Poised for growth with government initiatives like:
  - **National Green Hydrogen Mission**.
  - **Renewable Energy Capacity Expansion Targets**.
- **Challenges**:
  - Need for workforce formalization.
  - Skill gaps in emerging technologies like solar PV and wind energy.

SOCIETY & SOCIAL ISSUES

Supreme Court Recognizes Accessibility for Persons with Disabilities as a Fundamental Right

Syllabus Coverage

- **GS Paper II**: Social Justice - Vulnerable Sections and Welfare Policies.
- **GS Paper III**: Issues Related to Inclusive Development.

Context

The Supreme Court, in the case of **Rajive Raturi vs. Union of India & Ors.**, reaffirmed that the **right to accessibility** for Persons with Disabilities (PwDs) is a **human and fundamental right**. This judgment, based on a report by the Centre for Disability Studies (NALSAR), emphasizes the **social model of disability** and aims to remove societal barriers that hinder the inclusion and equality of PwDs.

Social Model of Disability

The judgment reinforces the **social model of disability**, which focuses on:

- **Eliminating social barriers** that restrict the full participation of PwDs.
- **Promoting inclusion and equality** in society.

Issues Faced by PwDs (Based on CDS NALSAR Report)

1. **Accessibility Barriers:** Lack of adequate accessibility measures in **courts, prisons, schools, public transport**, and other public spaces.
2. **Intersectionality and Compounded Discrimination:** PwDs face layered discrimination when combined with **caste, gender, or socioeconomic status**.
3. **Inconsistent Legal Framework: RPwD Act, 2016** mandates strict compliance, but Rule 15 of the **RPwD Rules, 2017** only prescribes self-regulatory guidelines, creating loopholes.

Key Highlights of the Judgment

1. **Rule 15(1) Declared Ultra Vires:** The court held that **Rule 15(1)** violates the intent of the **RPwD Act** and its mandatory compliance framework.
2. **Principles of Accessibility:** The court outlined critical principles for accessibility:
    - **Universal Design**: Infrastructure and services usable by all.
    - **Comprehensive Inclusion**: Across all types of disabilities.
    - **Assistive Technology**: Integration to empower PwDs.
    - **Stakeholder Consultation**: Involving PwDs in decision-making.
3. **Two-Pronged Approach:** Ensuring accessibility in **existing institutions** and **transforming new infrastructure** to meet accessibility standards.

Initiatives Promoting Accessibility for PwDs

1. **Rights-Based Approach**

- **RPwD Act, 2016**: Aligns with the **United Nations Convention on the Rights of Persons with Disabilities (UNCRPD)**.

2. **Article 9 of UNCRPD:** Obliges member states to ensure accessibility for PwDs in public spaces, services, and technologies.
3. **Accessible India Campaign (Sugamya Bharat Abhiyan):** Focused on creating **accessible physical and digital environments** for PwDs.

Important Judicial Pronouncements

1. **State of Himachal Pradesh v. Umed Ram Sharma (1986):** Recognized **right to accessibility** as part of the **Right to Life (Article 21)**.
2. **Disabled Rights Group v. Union of India (2017):** Directed compliance with reservation policies in **educational institutions** for PwDs.

Significance of the Judgment

1. **Upholds Fundamental Rights:** Establishes **accessibility** as a **constitutional mandate** under Article 21.
2. **Legal and Policy Clarity:** Aligns the **RPwD Rules, 2017** with the mandatory framework of the **RPwD Act, 2016**.
3. **Inclusive Development:** Promotes integration of **assistive technologies** and **universal design principles** for a barrier-free society.
4. **Empowerment of PwDs:** Strengthens their participation in **education, employment, and public life**.

Way Forward

5. **Enforce Accessibility Standards:** Mandate strict compliance with the **RPwD Act** and adopt a **zero-tolerance approach** to non-compliance.
6. **Invest in Infrastructure:** Upgrade public spaces, transport, and digital platforms to meet **universal design standards**.
7. **Capacity Building:** Train policymakers, architects, and developers in **inclusive design and assistive technologies**.
8. **Public Awareness Campaigns:** Promote awareness of the **rights and contributions of PwDs** to foster societal inclusion.

Gotti Koya Tribe

Context

The **National Commission for Scheduled Tribes (NCST)** has asked the Centre and States to submit a detailed report on the status of the **Gotti Koya (Guttikoya)** tribal community.

About the Gotti Koya Tribe

1. **Origin and Relocation**
   - Indigenous to **Chhattisgarh**, they relocated to neighboring states in **2005** due to violence between **Naxals**and Indian security forces.
2. **Language**
   - Speak **Gondi**, a south-central **Dravidian language**.
3. **Traditional Occupation**
   - **Hunting**, **food gathering**, and **fishing** form their primary livelihoods.
4. **Cultural Practices**
   - Deeply spiritual, they worship **nature** as their source of food and livelihood.
   - Celebrate **festivals and rituals** honoring various Gods and Goddesses.
5. **Political Organization**
   - Villages are politically organized with a head known as the **Patel**.

Challenges Faced by Gotti Koya Tribe

1. **Displacement:** Loss of traditional lands due to relocation and conflict.
2. **Livelihood Challenges:** Struggles to adapt to new environments and sustain traditional occupations.
3. **Cultural Erosion:** Risk of losing their language, traditions, and practices.
4. **Legal and Administrative Neglect:** Limited recognition and inclusion in government welfare schemes.

Way Forward

1. **Rehabilitation Measures:** Ensure proper resettlement with access to **land rights**, housing, and basic amenities.
2. **Preservation of Culture:** Promote **Gondi language** and cultural practices through education and community programs.
3. **Livelihood Support:** Introduce sustainable livelihood options while protecting traditional occupations.
4. **Welfare Integration:** Include the tribe under **Scheduled Tribes** welfare programs for education, health, and employment.

Women Empowerment: Progress, Challenges, and the Way Forward

Syllabus Coverage- GS Paper II: Social Empowerment, Issues Relating to Women, Government Policies and Interventions.

Context

India has achieved significant progress in **women's empowerment** across education, societal participation, and personal autonomy. However, persistent challenges in **employment opportunities** and **economic inclusion** continue to hinder their full potential contribution to the economy.

What is Women Empowerment?

Types of Women Empowerment

1. **Economic Empowerment:** Equal access to **employment opportunities**, **markets**, and **entrepreneurship**.
2. **Political Empowerment:** Increased participation in **decision-making roles** and **leadership positions** in politics.
3. **Social Empowerment:** Ensuring equal rights in **health**, **education**, **family decisions**, and **societal participation**.

Progress in Women Empowerment

1. **Educational Gains**

- Gender gap in education eliminated.
- **26% of young women** now have college degrees, up from **12% in 2011-12**.

2. **Marriage and Autonomy:** Rising **age at marriage**; **52% of women** now participate in choosing their partners.
3. **Societal Engagement:** Improved **mobility**, political participation, and **SHG membership** (doubled to **18%**).
4. **Family Support: 80% of women** report family approval for work, indicating a shift in social norms.

Barriers to Women Empowerment

1. **Employment Stagnation:** Decline in women's participation in **wage labor**: From **18% (2012)** to **14% (2022)**.

- Limited formal employment opportunities despite willingness to work.

2. **Unpaid Work Burden:** Overrepresentation in **unpaid family work**, especially in agriculture.

Other Challenges

Economic Challenges

- Persistent **pay gaps** and overrepresentation in **informal sectors**.
- **Motherhood penalty**: Limited career growth due to care responsibilities.

Political Challenges

- Low representation in **legislative bodies**.
- Lack of **intra-party democracy** and leadership opportunities.

Social Challenges

- Limited access to **healthcare**, **menstrual hygiene**, and basic amenities.
- **Threats to safety**, including **domestic violence** and workplace harassment.

Government Initiatives for Women Empowerment

Economic Empowerment

- **Maternity Benefit Act (2017)**: Paid maternity leave for working mothers.
- **Mudra Yojana**: Financial assistance for women entrepreneurs.

Political Empowerment

- **Nari Shakti Vandana Adhiniyam**: **33% reservation** for women in Lok Sabha and Assemblies.
- **73rd and 74th Amendments**: Reservations in local governance.

Social Empowerment

- **Prohibition of Child Marriage Act (2006)** and **MTP Amendment Act (2021)** for reproductive and marital rights.
- **Digital India Land Records Modernisation Programme**: Ensures women's land rights.

Way Forward

1. **Enhance Employment Opportunities**
   - Create public and private sector jobs tailored for women.
   - Implement large-scale **skilling and reskilling initiatives**.
2. **Ensure Workplace Safety:** Strictly enforce the **POSH Act (2013)** to create harassment-free environments.
3. **Improve Basic Amenities:** Address rural women's **health**, **hygiene**, and **education** gaps to improve workforce participation.
4. **Promote Women-Led Development:** Shift from welfare-centric approaches to empowering women as **drivers of progress** in all sectors.
5. **Foster Inclusive Policies:** Design programs that address **intersectional challenges** faced by marginalized women.

Bodo Tribe

Key Features

- **Inhabiting Areas**:
  - Assam's **Bodoland Territorial Region (BTR)**, covering Kokrajhar, Baksa, Udalguri, and Chirang districts.
  - Also found in **Bangladesh**, **Nepal**, and other Northeastern states.
- **Language and Culture**:
  - Speak **Bodo language**, a Tibeto-Burman language recognized in the **8th Schedule** of the Constitution.

Governance and Peace Accords

- **Bodoland Territorial Council**: Established under the **Sixth Schedule**.
- **Bodo Peace Accord (2020)**: Signed to enhance peace and development in BTR.

Significance

- **Bodoland Mahotsav** was organized in Delhi to celebrate **Bodo culture and literature**.

Empowering Tribal Society in India: Initiatives and Challenges

Syllabus Coverage

- **GS Paper II**: Welfare schemes for vulnerable sections, Social Justice, Governance.
- **GS Paper I**: Indian society, diversity of India.

Context

India's tribal population, constituting **8.6% of the population** (104.2 million), plays a crucial role in preserving the nation's diversity and traditions. Recognizing their socio-economic challenges, the government has initiated targeted programs to enhance their welfare, education, health, and cultural preservation.

Tribes in India

Who They Are

- **Adivasis**: Indigenous communities with distinct traditions, languages, and cultural practices.

Types of Tribes

1. **Scheduled Tribes (STs)**:
   - Recognized under **Article 366(25)** of the Constitution.
   - Characterized by **geographical isolation**, **economic backwardness**, and **distinct cultural traits**.
2. **Particularly Vulnerable Tribal Groups (PVTGs)**:
   - Subgroup of STs with **pre-agricultural technology**, **low literacy**, and **economic backwardness**.
   - **75 PVTGs** across **17 states** and **1 Union Territory**.

Tribal Population Data

- **Total Population**: 104.2 million (8.6% of India's population).
- **Major Tribes by Region**:
  - **Jammu & Kashmir**: Sippi, Beda.
  - **Arunachal Pradesh**: Kuki, Mikir.

- **Madhya Pradesh**: Gond, Kol.
- **Rajasthan**: Bhil, Dhanka.

Key Welfare Schemes for Tribals

1. Infrastructure Development

- **Dharti Aaba Janjatiya Gram Utkarsh Abhiyan (2024)**:
  - Budget: ₹79,156 crore.
  - Focus: Infrastructure, education, health, and livelihoods in **63,843 tribal villages**.
- **Pradhan Mantri Adi Adarsh Gram Yojana (PMAAGY)**:
  - Focus on basic infrastructure in **36,428 villages** with significant tribal populations.
- **Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM-JANMAN)**:
  - Targets PVTGs with improved housing, water, education, and connectivity.

2. Education Initiatives

- **Eklavya Model Residential Schools (EMRS)**:
  - Aim: Quality education for tribal students.
  - Progress: **728 schools approved**; ₹2,800 crore invested (2024).
- **Key Scholarships**:
  - **Pre-Matric and Post-Matric Scholarships** for ST students from Class IX to post-graduation.
  - **National Overseas Scholarship** for postgraduate and doctoral studies abroad.
  - **National Fellowship for ST Students** for higher education.

3. Financial Empowerment

- **National Scheduled Tribes Finance and Development Corporation (NSTFDC)**: Provides **concessional loans** for self-employment projects.
- **Adivasi Mahila Sashaktikaran Yojana (AMSY)**: Loans up to ₹2 lakh per unit for tribal women.
- **Micro Credit Scheme for SHGs**: Loans up to ₹5 lakh per SHG and ₹50,000 per member.
- **Adivasi Shiksha Rin Yojana**: Education loans up to ₹10 lakh for professional courses.

Health Initiatives

1. **Sickle Cell Anaemia Elimination Mission**: Screening and affordable care for tribal populations.
2. **Mission Indradhanush**: Ensures immunization for children and pregnant women.
3. **Nikshay Mitra Initiative**: Focused on **tuberculosis (TB) treatment** and improving health outcomes for tribal communities.

Cultural and Research Preservation

- **Support for Tribal Research Institutes (TRIs)**: Focus on tribal welfare, language preservation, and cultural studies.
- **Development of PVTGs**: Targeted interventions to address socio-economic gaps among **75 PVTGs**.
- **TRI-ECE Initiative**: Organizes **cultural festivals**, exhibitions, and awareness campaigns to promote tribal heritage.

Significance of Tribal Empowerment

1. **Preservation of Cultural Diversity**: Strengthens India's unique identity as a land of diversity.
2. **Economic Inclusion**: Improves tribal participation in India's growth story through self-reliance and entrepreneurship.
3. **Social Justice**: Bridges inequalities, ensuring **education, healthcare**, and equal opportunities.

4. **Environmental Sustainability**: Tribes are **custodians of forests and biodiversity**, making their empowerment critical for ecological balance.

Way Forward

1. **Holistic Development**: Strengthen integration of tribal welfare schemes across sectors.
2. **Community Participation**: Involve tribal communities in policy formulation and implementation.
3. **Focus on Education and Skilling**: Expand access to quality education and skill development programs.
4. **Healthcare Outreach**: Enhance medical facilities in tribal regions, addressing specific health issues like anemia and malnutrition.

GEOGRAPHY AND DISASTER MANAGEMENT

"State of the Cryosphere 2024: Alarming Ice Loss and Its Global Implications"

Syllabus Coverage

- **GS Paper I**: Geography – Physical Geography, Cryosphere, and Climate Change.
- **GS Paper III**: Environment – Conservation, Climate Change, and Disaster Management.

Context

The **State of the Cryosphere 2024: Lost Ice, Global Damage Report**, released by the **International Cryosphere Climate Initiative (ICCI)**, highlights alarming trends in **ice loss** and its cascading impact on the global climate.

About the Cryosphere

1. **Definition:** Refers to regions of the Earth where **snow and ice** persist due to temperatures below **0°C** for at least part of the year.
2. **Components**
   - Includes **continental ice sheets**, **ice caps**, **glaciers**, **permafrost**, and **seasonal snow cover**.
   - Examples: **Greenland**, **Antarctica**, **Hindu Kush Himalaya**, **Alaska**, and **Patagonia**.

Key Findings of the 2024 Report

1. **Accelerated Ice Loss**
   - **Greenland Ice Sheet** is losing **30 million tons of ice per hour**.
   - **Ice shelves** in northern Greenland have lost **35% of their total volume** since 1978.
2. **Sea Level Rise**
   - Global sea-level rise has **doubled in the last 30 years**.
   - Projected to increase to **6.5 mm/year by 2050**, exacerbating coastal flooding and erosion.
3. **Melting Glaciers**
   - **Venezuela** recently lost its last glacier, following **Slovenia**, which became the first nation to experience this phenomenon.
   -

Impacts of Cryosphere Changes on Global Climate

1. **Ocean Circulation Disruption**
   - Weakening of the **Atlantic Meridional Overturning Circulation (AMOC)** and slowing of the **Antarctic Circumpolar Current (ACC)** disrupts global **ocean circulation** patterns.
2. **Thawing Permafrost**
   - Melting permafrost releases **CO_2 and methane**, exacerbating global warming.
   - Local damages include **infrastructure instability** in Arctic regions.
3. **Albedo Effect Reduction**
   - Loss of reflective sea ice increases heat absorption at the poles, accelerating **global warming**.
4. **Increased Flood Risks**
   - Melting glaciers lead to **Glacial Lake Outburst Floods (GLOFs)**, threatening downstream communities.
5. **Ozone Depletion**
   - Increased warming contributes to the depletion of the **ozone layer** over polar regions.

Initiatives to Protect the Cryosphere

1. **Global Efforts**
   - **United Nations General Assembly (UNGA)**: Declared **2025–2034** as the **Decade of Action for Cryospheric Sciences**.
   - **World Meteorological Organization (WMO)**: Adopted **High-Level Ambitions** for the cryosphere, focusing on monitoring and mitigation.
2. **National Efforts in India**
   - **National Mission for Sustaining Himalayan Ecosystem (NMSHE)**:
     - Monitors **Himalayan glaciers** and assesses the health of the Himalayan ecosystem.
     - Promotes sustainable practices to mitigate the impact of climate change in fragile ecosystems.
3. **Scientific Advancements**
   - Development of **satellite monitoring** systems for real-time observation of ice loss and its impacts.
   - Enhanced predictive models for **sea-level rise** and **GLOFs**.

Significance of the Findings

1. **Global Climate Stability:** Cryosphere changes disrupt **ocean circulation**, impacting weather patterns and ecosystems worldwide.
2. **Threat to Coastal Communities:** Rising sea levels threaten **low-lying islands** and **coastal cities**, risking displacement of millions.
3. **Biodiversity Loss:** Melting glaciers and reduced snow cover endanger species dependent on **cold ecosystems**.
4. **Call to Action:** Highlights the urgency of meeting the **Paris Agreement goals** to limit global warming to **1.5°C**.

Way Forward

1. **Strengthening Global Cooperation:** Enhance multilateral collaborations through platforms like **IPCC** and **UNFCCC**.
2. **Local Adaptation Strategies:** Promote community-based **disaster preparedness** for regions vulnerable to GLOFs and permafrost thawing.
3. **Investment in Cryospheric Science:** Allocate more funding for research on **cryosphere dynamics** and their global impact.
4. **Public Awareness:** Educate stakeholders about the critical role of the cryosphere in regulating the Earth's climate.

Anusandhan National Research Foundation Launches PAIR Programme to Boost Innovation

Syllabus Coverage

- **GS Paper II**: Education, Government Policies and Interventions.
- **GS Paper III**: Science and Technology – Research and Innovation.

Context

The **Anusandhan National Research Foundation (ANRF)** has launched the **'Partnerships for Accelerated Innovation and Research' (PAIR)** initiative to transform research and innovation in India's **Higher Education Institutions (HEIs)**, aligning with the goals of the **National Education Policy (NEP) 2020**.

About the PAIR Programme

1. **Structure**
    - **Hub and Spoke Model**:
        - **Hubs**: Top-ranking institutions (based on **NIRF rankings**) to act as **research mentors**, sharing resources and expertise.
        - **Spokes**: Emerging institutions, including **central and state universities**, selected **NITs**, and **IIITs**.
2. **Objective**
    - Promote **collaborative research** between top-performing and emerging institutions.
    - Build a **robust research ecosystem** by fostering resource sharing and mentorship.
3. **Phased Implementation**
    - Initially focused on **public universities and institutes**, with plans to expand in subsequent phases.

State of India's Research Ecosystem

Strengths

- **Third-largest higher education system** globally (after the U.S. and China).
- Ranked **4th** in global research paper publications (2017–2022).

Challenges

1. **Low Research Quality:** India lags in **citations per document** and **Hirsch Index (H-Index)** compared to peers.
2. **Limited Research Translation:** Research often remains theoretical, with minimal **real-world application**.
3. **Funding Constraints:** Dependence on **government funding**, unlike global counterparts that attract **private investments**.
4. **Low R&D Expenditure:** India's **R&D spending** is **0.65% of GDP**, far behind:
    - **South Korea**: 4.8%.
    - **United States**: 3.4%.
5. **Administrative Burden:** Faculty members face excessive administrative workloads, leaving limited time for research.

Significance of PAIR and ANRF

1. **Collaborative Growth: Hubs** help **spokes** improve research quality through mentorship and resource sharing.
2. **Enhanced Innovation :**Facilitates **cross-disciplinary collaboration** and **real-world impact** of research projects.

3. **Increased Private Participation:** Encourages private sector partnerships to diversify funding sources.
4. **Policy Alignment:** Aligns with **NEP 2020**, focusing on making India a global **knowledge hub**.

Other Supporting Initiatives

1. **SERB-SURE (Scientific and Useful Research in Education):** Aims to fund impactful research projects in higher education.
2. **IMPRINT (Impacting Research, Innovation, and Technology):** Addresses major engineering challenges to boost **Make in India**.
3. **Atal Innovation Mission (AIM) :** Encourages grassroots innovation and entrepreneurship.

Way Forward

1. **Increase R&D Spending:** Raise R&D investment to **2% of GDP**, focusing on **quality research** and innovation.
2. **Private Sector Engagement:** Incentivize private funding through tax benefits and public-private partnerships.
3. **Capacity Building:** Provide **training programs** for faculty and researchers to improve research output.
4. **Quality Metrics:** Introduce performance-linked incentives for **high-impact publications**.
5. **Administrative Reforms:** Reduce bureaucratic workload for faculty to focus more on research.

Palaeocene-Eocene Thermal Maximum (PETM)

About PETM

- **Timeline**: Occurred 56 million years ago (Ma).
- **Characteristics**:
  - Global mean surface temperature increased by **4–5°C**.
  - Marked by the **highest carbon release rates** over the past 66 million years.

Triggers for Warming

- **Volcanism**: Associated with the North Atlantic Igneous Province.
- **Methane Hydrates**: Dissociation of oceanic methane hydrates.
- **Orbital Variations**: Controlled massive carbon release.
- **Extraterrestrial Impact**: Hypothesized to have contributed to warming.

Recent Findings

- IIT-KGP's study confirmed the **PETM age of Gujarat's Vastan coal layers**, highlighting tropical rainforest survival during intense global warming.

24 Coastal Villages in Odisha Recognized as 'Tsunami Ready' by UNESCO

Syllabus Coverage

- **GS Paper III**: Disaster Management, Coastal Management, and International Cooperation.
- **GS Paper II**: India and International Institutions.

Context

Twenty-four coastal villages in Odisha have achieved **UNESCO's 'Tsunami Ready' recognition**, emphasizing their preparedness for tsunami risks. This milestone was highlighted during the **2nd Global Tsunami Symposium** in Indonesia and marks a significant achievement in India's coastal disaster management efforts.

About UNESCO-IOC Tsunami Ready Recognition Programme (TRRP)

1. **Objective**:
   - Enhance **tsunami risk prevention** and mitigation in global coastal zones.
   - Protect lives, livelihoods, and properties through awareness and preparedness.
2. **Approach**:
   - **Community-based Effort**: Encourages local engagement to build resilience.
   - **Preparedness Indicators**: Includes 12 criteria for consistent evaluation, with recognition renewable every four years.
3. **Global Importance**:
   - Helps coastal communities adopt a standardized, proactive approach to **tsunami readiness**.

What is a Tsunami?

1. **Definition**:
   A series of massive waves caused by **underwater disturbances** like earthquakes, volcanic eruptions, landslides, or coastal rock falls.
2. **Characteristics**:
   - **Speed**: Up to **500 mph** in deep water; slows to **20-30 mph** in shallow waters, increasing wave height.
   - **Origin**: Derived from Japanese words "tsu" (harbour) and "nami" (wave).
3. **Impact Factors**:
   - Tsunami speed depends on **ocean depth**, not distance from the source.
   - Coastal areas with shallow waters experience **increased wave heights**, amplifying destruction.

India's Preparedness and Tsunami Management

1. **Indian Tsunami Early Warning Centre (ITEWC)**:
   - Monitors seismic activity and provides **tsunami advisories** to **25 Indian Ocean countries**.
   - Equipped with a network of **tsunami buoy systems** transmitting real-time data.
2. **Real-Time Tide Gauges**:
   - **INCOIS** (Indian National Centre for Ocean Information Services) operates tide gauges along the Indian coast for real-time monitoring.
3. **NDMA Guidelines**:
   - Comprehensive protocols for **Tsunami Management** include early warning systems, evacuation planning, and public awareness campaigns.
4. **Modeling and Mapping**:
   - Advanced simulation and mapping of tsunami risks along India's coast to enhance preparedness.

Odisha's Achievement: Recognized Coastal Villages

1. **Role of National Tsunami Ready Recognition Board (NTRB)**:
   - Verified the preparedness of Odisha's villages based on **12 TRRP indicators**.
   - Collaboration between **INCOIS** and **NDMA** ensured rigorous evaluation.
2. **Key Outcomes for Odisha**:
   - Enhanced awareness and training for local communities.
   - Infrastructure and communication systems for effective **disaster response**.

- Strengthened India's leadership in **community-based disaster risk reduction**.

Way Forward

1. **Replication Across Coastal Zones**: Expand the 'Tsunami Ready' model to other vulnerable coastal regions in India.
2. **Community Engagement**: Involve local populations in regular **training and mock drills** to ensure sustained preparedness.
3. **Strengthen Infrastructure**: Build robust evacuation shelters, signage, and communication networks in vulnerable zones.
4. **International Cooperation**: Enhance collaboration with UNESCO-IOC and other international bodies for **knowledge sharing** and technological advancements.
5. **Innovative Technology**: Leverage **AI** and **big data analytics** for improved tsunami prediction and faster dissemination of warnings.

HISTORY, ART & CULTURE

Shahjahanpur and Its Role in the 1857 Rebellion

Syllabus Coverage- GS Paper I: Modern Indian History (The Freedom Struggle and Its Various Stages).

Context

A farmer in Shahjahanpur, Uttar Pradesh, recently unearthed a **cache of weapons** believed to be from the 1857 Indian Rebellion, reigniting interest in the region's pivotal role in India's first war of independence. Shahjahanpur stands out as a significant site of resistance against British colonial rule during the rebellion.

Shahjahanpur and the 1857 Rebellion

1. **Formation of Shahjahanpur**

- **Established**: Shahjahanpur district was formed in 1813-14 under British administration.
- **Significance**: Became a hotbed of discontent due to **local grievances** and **revolutionary zeal**.

2. **Role of the Sepoys**

- **The 28th Indian Infantry** stationed in Shahjahanpur was central to the rebellion.
- **Causes of Discontent**:
  - Rumours of **greased cartridges** (cow and pig fat) affronted religious sentiments.
  - Allegations of **adulterated flour** further angered the sepoys.

3. **Initial Uprising**

- **Date**: May 31, 1857.
- **Key Events**:
  - Attack on the **European congregation** at the Roman Catholic Church.
  - **Seizure of the treasury** and release of prisoners from the jail.

4. **Governance by Revolutionaries**

- **Leadership**: Qadir Ali Khan and Ghulam Husain Khan were declared joint governors.
- **Action**: The revolutionaries proclaimed the overthrow of British rule in Shahjahanpur, establishing self-governance.

5. **Resistance Against British Recapture**

- **Counterattack in 1858**: Revolutionaries confined British troops in a fortified jail for **10 days**.
- **Outcome**: British reinforcements, aided by betrayal from local collaborators, allowed the colonial forces to regain control.

6. **Violent Repression**

- After recapturing Shahjahanpur, the British launched a **brutal crackdown**, suppressing the rebellion and quelling the **self-rule movement**.

Significance of Shahjahanpur in the Rebellion

1. **Key Revolutionary Figures**

- **Maulvi Ahmadullah Shah**: A prominent leader who coordinated resistance against British forces.
- **Nana Sahib**: Played a significant role in uniting forces against colonial rule.

2. **Symbol of Defiance**

- Shahjahanpur exemplified widespread **discontent** with British policies.
- The events symbolized the **destruction of British authority** and a yearning for **freedom**.

3. **Legacy**

- The rebellion showcased the **regional unity** against the British and became a precursor to later movements for Indian independence.

Celebrating 555th Guru Nanak Jayanti: Teachings of a Spiritual Visionary

Syllabus Coverage

- **GS Paper I**: Indian Culture – Salient aspects of Art Forms, Literature, and Architecture from ancient to modern times.
- **GS Paper IV**: Ethics – Contributions of moral thinkers and leaders from India and the world.

Context

The 555th **Guru Nanak Jayanti**, marking the birth anniversary of **Guru Nanak Dev Ji**, was celebrated with reverence across India and the world. His teachings of **equality**, **truthfulness**, and **compassion** continue to inspire humanity to uphold the values of **kindness**, **humility**, and **brotherhood**.

About Guru Nanak Dev Ji

1. **Birth**: Born in **1469** at Talwandi (present-day Nankana Sahib, Pakistan).
2. **Life and Philosophy**:
    - Founded **Sikhism**, emphasizing equality, compassion, and righteous living.
    - Established **Kartarpur Sahib** as a center for spiritual learning and social commitment.
3. **Successor**:
    - Appointed **Lehna**, later known as **Guru Angad Dev Ji**, as his successor.
    - Guru Angad compiled Guru Nanak's teachings and continued his mission.
4. **Key Idea of Liberation**: Liberation was envisioned as an **active life** rooted in **social responsibility**, not merely a state of bliss.

Major Teachings of Guru Nanak Dev Ji

1. **Ik Onkar**: Belief in **One God**, the eternal truth present in all beings and creations.
2. **Truthfulness**: Truth is the **highest virtue** and must be reflected in one's life and actions.
3. **Equality**: Opposed the **caste system** and all forms of social and gender inequality.
4. **Religion and Wealth**: Cautioned against using religion as a means to **accumulate material wealth**.
5. **Three Pillars of Sikhism**:
    - **Naam Japo**: Meditate and remember God.
    - **Kirat Karo**: Earn an honest livelihood.
    - **Vaand Chhako**: Share resources with others, promoting welfare for all.

Relevance of Teachings in Modern Times

1. **Equality and Brotherhood**: A solution to issues like **gender inequality**, **caste-based discrimination**, and **conflicts** in a divided world.
2. **Sharing Wealth (Vaand Chhako)**: Reducing the growing **economic inequalities** between the rich and poor.
3. **Righteous Earnings (Kirat Karo)**: Addressing **corruption** and fostering ethical business practices.
4. **Welfare of All (Sarbat da Bhala)**: Encourages **climate action** and **ecological justice** through collective well-being.
5. **Truthfulness**: Guides individuals and institutions toward **transparency** and **integrity** in governance and daily life.

AGRICULTURE

Addressing the Hidden Costs of Agrifood Systems: Insights from the State of Food and Agriculture 2024

Syllabus Coverage

- **GS Paper II**: Issues Related to Health, Nutrition, and Governance.
- **GS Paper III**: Agriculture, Food Security, and Environmental Conservation.

Context

The **State of Food and Agriculture 2024 report**, published by the **Food and Agriculture Organization (FAO)**, highlights the **hidden costs of global agrifood systems**. In India, dietary risks are identified as a significant factor, contributing to a staggering **$1.3 trillion burden annually**, primarily due to non-communicable diseases (NCDs) linked to **unhealthy eating habits**.

Key Highlights of the Report

1. **Hidden Costs in Agrifood Systems**

- **India**:
    - Third highest globally, with a **$1.3 trillion annual burden**.
    - **73% of costs** arise from unhealthy dietary patterns, such as:
        - **Overconsumption of processed foods**: Accounts for $128 billion.
        - **Insufficient plant-based food intake**: Costs $846 billion.
- **Global Scenario**:
    - Total hidden costs: **$12 trillion annually**.

- Dietary risks account for **$8.1 trillion**.

2. **Health Impacts**

- In India, **non-communicable diseases (NCDs)** dominate hidden costs, including:
  - **Heart diseases**.
  - **Diabetes**.
- High consumption of **processed foods** and low intake of **nutritious plant-based diets** exacerbate health challenges.

3. **Environmental and Social Costs**

- **Environmental Degradation**: Greenhouse gas emissions and **nitrogen runoff** from food production are significant contributors.
- **Social Impacts**: Inequitable land use and harmful agricultural practices affect rural livelihoods.

Recommendations by FAO

1. **Promoting Sustainable Practices:** Introduce **financial incentives** to encourage eco-friendly practices across the food supply chain.

2. **Encouraging Healthier Diets:** Implement policies to make **nutritious and affordable food** accessible to all sections of society.

3. **Environmental Action:** Support reductions in **emissions** and harmful agricultural practices through:

  - **Certifications** for sustainable farming.
  - **Industry-wide initiatives** to promote greener practices.

4. **Raising Consumer Awareness:** Empower consumers with **transparent information** about the environmental and social impact of their food choices.

About the Food and Agriculture Organization (FAO)

1. **Mandate**

- Improve **global nutrition**, enhance **agricultural productivity**, elevate **rural living standards**, and boost **economic growth**.

2. **Functions**

- **Research and Technical Assistance**: Provides expertise in sustainable agriculture and food security.
- **Global Coordination**: Leads international efforts in **agriculture** and **food systems**.
- **Data Collection**: Maintains extensive data on production, trade, and consumption patterns.

3. **Key Reports Published**

- **State of the World's Forests**.
- **State of World Fisheries and Aquaculture**.
- **State of Agricultural Commodity Markets**.

4. **Background Information**

- **Established**: October 1945.
- **Headquarters**: Rome, Italy.
- **Membership**: 194 countries and the European Union.
- **Funding**: Fully funded by member contributions.

Significance of the Report

1. **Health Policy Reform:** Highlights the need for **targeted policies** to tackle NCDs caused by unhealthy diets.
2. **Environmental Conservation:** Draws attention to the **ecological damage** caused by unsustainable agricultural practices.
3. **Food Security Goals:** Aligns with global efforts like the **UN's Sustainable Development Goals (SDG 2: Zero Hunger)**.
4. **Economic Implications :**Stresses the hidden economic burden of food systems on national and global economies.

Way Forward

1. **Integrated Policies:** Formulate multi-sectoral strategies addressing **health, agriculture, and environment**.
2. **Incentivizing Plant-Based Diets:** Promote **plant-based nutrition** through subsidies and public awareness campaigns.
3. **Invest in Research and Technology:** Develop technologies for **sustainable food production** and **waste reduction**.
4. **Global Cooperation:** Collaborate with international organizations to exchange knowledge and best practices.

FAO's 'State of Food and Agriculture 2024': Unveiling Hidden Costs in Agrifood Systems

Syllabus Coverage

- **GS Paper III**: Issues Related to Agriculture and Food Security, Environmental Conservation.
- **GS Paper II**: Policies and Interventions for Development in Agriculture.

Context

The **Food and Agriculture Organization (FAO)** released the **'State of Food and Agriculture 2024' report**, which emphasizes the **value-driven transformation of agrifood systems**. It sheds light on the **hidden costs** of food systems, particularly in industrialized economies, and provides actionable recommendations for sustainable transformation.

Key Highlights of the Report

1. **Understanding Hidden Costs**

- **Definition**: Hidden costs refer to **external costs** or economic losses resulting from market or policy failures.
- **Types of Costs**:
  - **Health Costs**: Dominated by **non-communicable diseases** (NCDs) like diabetes and heart disease.
  - **Social Costs**: Resulting from **undernourishment** and poverty.
  - **Environmental Costs**: **Greenhouse gas emissions** and other ecological damages.

2. **Global Findings**

- **Total Hidden Costs**: $5.9 trillion (2020 PPP dollars) annually in industrial and diversifying agrifood systems.
- **Unhealthy Diets**: Account for **70% of all hidden costs**, driven by:
  - Low intake of **whole grains**.
  - High intake of **sodium** and processed foods.

3. **India-Specific Findings**

- **Hidden Costs in India**: $1.3 trillion annually, the **3rd highest globally** after China and the USA.
- **Primary Drivers**:

- **Unhealthy dietary patterns** dominate costs.
- **Social and environmental costs** also contribute significantly.

Major Recommendations for Transforming Agrifood Value Chains

1. **In Industrial Agrifood Systems**

- **Characteristics**: Long value chains, high urbanization, and diversified diets.
- **Recommendations**:
  - Upgrade **dietary guidelines** to incorporate agrifood systems perspectives.
  - Implement **mandatory nutrient labeling** and **certifications**.
  - Launch **information campaigns** on sustainable and nutritious diets.

2. **In Traditional Agrifood Systems**

- **Characteristics**: Short value chains and low urbanization.
- **Recommendations**:
  - Complement **productivity-enhancing interventions** with environmental sustainability measures.
  - Introduce **dietary levers** to minimize ecological footprints.

India's Initiatives to Reform Agrifood Systems

1. **Sustainable Farming Practices**

- **Paramparagat Krishi Vikas Yojana (PKVY)**: Promotes organic farming.
- **Per Drop More Crop (PDMC)**: Focuses on micro-irrigation to conserve water.
- **National Bamboo Mission (NBM)**: Encourages sustainable bamboo cultivation.

2. **Agricultural Infrastructure Development**

- **Agriculture Infrastructure Fund (AIF)**: Supports post-harvest and farm-gate infrastructure.
- **Agricultural Marketing Infrastructure (AMI)**: Enhances market connectivity for farmers.

3. **Boosting Farmers' Welfare**

- **Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)**: Provides direct income support to farmers.
- **Farmer Producer Organizations (FPOs)**: Encourages collective marketing and value addition.

Significance of the Report

1. **Rethinking Agrifood Systems:** Highlights the need for **policy-driven changes** to reduce health, social, and environmental hidden costs.

2. **Focus on Sustainability:** Encourages integrating **sustainable farming practices** into agrifood value chains.

3. **Global and Local Implications:** Aligns with India's initiatives like **Doubling Farmers' Income** and **Sustainable Development Goals (SDGs)**.

4. **Consumer Awareness:** Stresses the importance of **dietary shifts** towards healthier, plant-based, and environmentally friendly foods.

Challenges in Implementation

1. **Lack of Awareness:** Limited consumer understanding of the hidden costs associated with their food choices.

2. **Resource Constraints:** Difficulty in transitioning small farmers to sustainable practices due to financial and technical barriers.

3. **Policy Gaps:** Need for cohesive policies addressing both **health and environmental externalities** of agrifood systems.

Way Forward

1. **Promote Sustainable Diets:** Educate consumers on the **health and environmental benefits** of balanced diets.
2. **Support Sustainable Agriculture:** Expand schemes like **PKVY** and **FPOs** to increase farmer participation in eco-friendly practices.
3. **Strengthen Value Chains:** Invest in **post-harvest technologies** and **infrastructure** to reduce waste and improve efficiency.
4. **Leverage Technology:** Use **AI and Big Data** to optimize food supply chains and reduce inefficiencies.
5. **Global Collaboration:** Partner with international organizations to implement best practices in agrifood systems management.

Nano Fertilizers

Context

Indian scientists have developed a **nanomaterial coating (nanoclay)** for **Muriate of Potash (MoP)**, which accounts for **80% of potassium fertilizer needs** in agriculture.

What are Nano Fertilizers?

1. **Definition**
   - Nutrients encapsulated or coated within **nanomaterials** (measuring **100 nanometers or less**).
   - Facilitate **controlled release** of nutrients, ensuring slow and sustained diffusion into the soil.
2. **Examples**
   - **Nano Urea** and **Nano Zinc**, commonly used in Indian agriculture.

Benefits of Nano Fertilizers

1. **Promotes Sustainable Farming:** Minimizes **soil and water contamination** caused by conventional fertilizers.
2. **Cost-Effectiveness**
   - Improves nutrient absorption.
   - Reduces **wastage of nutrients** and lowers **application frequency**.
3. **Environmental Impact:** Decreases nutrient runoff, ensuring ecological safety.
4. **Boosts Agricultural Productivity:** Enhances nutrient efficiency, increasing crop yield.

Way Forward for Nano Fertilizers

1. **Research and Development:** Expand research on other nutrient coatings like **phosphates** and **micronutrients**.
2. **Farmer Awareness Programs:** Educate farmers on the benefits and application techniques of nano fertilizers.
3. **Policy Support:** Incentivize the production and adoption of nano fertilizers.

Diammonium Phosphate (DAP)

- **Composition**: High concentration of **phosphate** and **nitrogen**, essential for plant growth.
- **Features**: Most commonly used fertilizer due to high solubility and effectiveness.
- **Distribution**:
  - **Decontrolled** since 1992, regulated by **market forces**.
  - The Union Government monitors availability, while State Governments handle distribution.

ENVIRONMENT & ECOLOGY

Unlocking the Potential of Wind Energy in India

Syllabus Coverage

- **GS Paper III**: Renewable Energy and Environmental Sustainability.
- **GS Paper I**: Distribution of Key Natural Resources.

Context

Tamil Nadu, a **leader in wind power**, faces challenges including outdated turbines, policy barriers, and land constraints. The Tamil Nadu Repowering, Refurbishment, and Life Extension Policy – 2024 seeks to address these issues. However, it has encountered opposition from stakeholders citing concerns over financial viability and operational difficulties.

India's Wind Energy Capacity and Potential

1. Wind Energy Potential (Source: National Institute of Wind Energy)

- **At 150m height**: 1,163.86 GW.
- **At 120m height**: 695.51 GW, including **68.75 GW in Tamil Nadu**.
- **Utilization**:
  - Nationally: ~6.5%.
  - Tamil Nadu: ~15%.

2. Installed Capacity (As of 2024, MNRE Database)

- **National Total**: 44.89 GW.
- **Tamil Nadu**: 10,603.5 MW (second largest).
- Leading states: **Gujarat, Tamil Nadu, Karnataka, Maharashtra, Rajasthan, Andhra Pradesh** (contributing ~93% of total capacity).

Maintenance Strategies for Wind Turbines

1. **Repowering**

- **Definition**: Complete replacement of old turbines (below 2 MW) with modern, high-efficiency ones.
- **Benefits**: Enhances generation capacity and efficiency.

2. **Refurbishment**

- **Definition**: Upgrading components like taller towers, new blades, and advanced gearboxes.
- **Purpose**: Improves performance without full turbine replacement.

3. **Life Extension**

- **Definition**: Safety and structural measures to extend turbine lifespan.
- **Challenges**: Requires significant investment in **land, technology**, and **evacuation infrastructure**.

Repowering and Refurbishing: Opportunities and Challenges

Advantages

1. **Increased Energy Generation**: Modern turbines (e.g., 2.5 MW) replace older, less efficient ones (e.g., 250 kW).
2. **Efficient Land Use**: Maximizes energy output from high-potential sites.

Challenges

1. **Land Constraints**: Issues arise from densely populated areas and habitation near wind farms.
2. **Banking Facilities Loss**: Repowered turbines in Tamil Nadu lose access to banking systems.
3. **Transmission Infrastructure**: Inadequate evacuation networks, such as at **Aralvaimozhi**, limit energy distribution.

Pros and Cons of Wind Energy

Pros	Cons
Green Energy: No emissions, reduces carbon footprint.	**Intermittency**: Wind availability is inconsistent.
Renewable Source: Infinite supply.	**High Upfront Costs**: Manufacturing and installation are expensive.
Low Operational Costs: Cost-effective post-installation.	**Wildlife Threat**: Risks to birds and bats.
Space Efficiency: High output on small land areas.	**Noise and Visual Impact**: Aesthetic concerns for residents.
Dual Land Use: Compatible with grazing or farming.	**Remote Locations**: Challenges in transmission to demand centers.
Cost Reduction: 80% decline since 1980.	**Land Use Issues**: Regulatory and clearance delays.

Way Forward

1. **Policy Refinements:** Address **financial concerns** and streamline operational frameworks to incentivize repowering.
2. **Infrastructure Development:** Strengthen **evacuation and transmission networks** at high-potential sites.
3. **Sustainability Measures:** Balance **environmental concerns** with energy needs to ensure long-term viability.
4. **Technological Upgrades:** Adopt modern, **high-efficiency turbines** to maximize land and resource utilization.

Accelerating Sustainability: The 'EV as a Service' Programme

Syllabus Coverage

- **GS Paper III**: Environment, Climate Change, and Sustainable Development.
- **GS Paper II**: Government Policies and Interventions for Development in Various Sectors.

Context

The Government of India, through **Convergence Energy Services Limited (CESL)**, has launched the **'EV as a Service' programme** to promote **electric vehicle (EV) adoption** in government offices. This initiative supports the nation's **net-zero emissions target by 2070** and contributes to global sustainability efforts.

About 'EV as a Service' Programme

1. **Launching Organization**

- **CESL**: A subsidiary of **Energy Efficiency Services Limited (EESL)**.
- Works under the **Ministry of Power** and the **Ministry of Housing & Urban Affairs**.

2. **Objective**

- **Deployment of 5,000 E-Cars** in Central and State Government ministries/departments within the next two years.
- Aims to **reduce emissions** and **promote e-mobility** in public administration.

3. **Implementation**

- **Flexible Procurement Model**:
  - Allows government departments to select from a range of **E-Car makes and models** tailored to operational requirements.
- Focuses on **sustainability goals** by reducing dependence on **fossil fuels**.

4. **Key Features**

- **Support for Sustainability**:
  - Contributes to achieving India's **net-zero target by 2070**.
  - Reduces **carbon emissions** significantly.
- **Current Deployment**: 2,000 E-Cars deployed and **17,000 E-Buses facilitated** across India by CESL.
- **Awareness Campaigns**: Includes an **EV rally** showcasing diverse electric vehicles to promote public awareness of e-mobility options.

Significance of the Programme

1. **Environmental Impact**

- **Reduction in Carbon Footprint**:
  - Transition to EVs decreases greenhouse gas emissions and improves air quality.
- **Decreased Dependence on Fossil Fuels**:
  - Promotes energy security by reducing oil imports.

2. **Economic Benefits**

- Encourages **indigenous EV manufacturing** under **Make in India**.
- Creates **employment opportunities** in EV production, servicing, and charging infrastructure.

3. **Policy Alignment**

- Supports initiatives like the **Faster Adoption and Manufacturing of Electric Vehicles (FAME)** scheme.
- Contributes to India's commitments under the **Paris Agreement**.

4. **Public Sector Leadership**

- Sets an example for **private organizations** and individuals to adopt e-mobility.

Challenges and Way Forward

Challenges

1. **Infrastructure Constraints**: Insufficient **EV charging infrastructure** in government and public areas.
2. **High Initial Costs**: EV adoption may face resistance due to higher upfront costs despite long-term savings.
3. **Limited Awareness**: Lack of information about EV benefits among government employees and the public.

Way Forward

1. **Expand Charging Infrastructure**: Develop a robust network of **public and private charging stations** nationwide.

2. **Subsidies and Incentives**: Provide **financial incentives** to government departments for adopting EVs.
3. **Awareness Campaigns**: Conduct extensive campaigns to educate stakeholders about EV benefits and usage.
4. **Technological Advancements**: Encourage **research and development** to improve EV efficiency and affordability.

COP29 Approves Global Carbon Market Standards Under Paris Agreement's Article 6

Syllabus Coverage- GS Paper III: Environment - Climate Change, International Agreements, and Carbon Markets.

Context

At **COP29**, a landmark decision was made to establish a **centralized carbon market** under the **United Nations**, finalizing negotiations under **Article 6 of the Paris Agreement**. This framework paves the way for international collaboration to achieve **climate targets**.

About Article 6 of the Paris Agreement

Principles

- **Voluntary Cooperation**: Enables countries to work together to meet their **Nationally Determined Contributions (NDCs)**.
- **Carbon Credit Trading**: Allows countries to transfer credits earned by reducing **greenhouse gas (GHG) emissions**, assisting others in meeting climate goals.

Key Sub-Sections

1. **Article 6.2**
   - **Mechanism**: Countries can trade **emission reductions/removals** through **bilateral or multilateral agreements**.
   - **Credits**: Known as **Internationally Transferred Mitigation Outcomes (ITMOs)**, measured in **carbon dioxide equivalent (CO_2e)** or other metrics.
2. **Article 6.4**
   - **Global Carbon Market**: Overseen by the **Article 6.4 Supervisory Body (6.4SB)** under the UN.
   - **Credits**: Referred to as **A6.4ERs**, available for purchase by **countries, companies, or individuals**.
   - **Current Standards**: Proposed at the **Baku meeting** of the **6.4SB** in October 2024.

Significance of Agreed Carbon Market Standards

1. **Unlocks Financial Support:** Channels funding to **developing countries** for climate mitigation and adaptation.
2. **Market Reliability:** Establishes protocols for **post-credit monitoring** and ensures **long-term market stability**.
3. **Encourages Climate Action:** Promotes global cooperation in reducing GHG emissions through **transparent and accountable systems**.

Carbon Markets: Mechanisms and Instruments

What are Carbon Markets?

- Enable **governments** and **non-state actors** to trade **greenhouse gas emission credits** to meet their climate targets.
-

Types of Carbon Pricing Instruments

1. **Compliance Mechanisms:** Implemented and managed by **governments**.
    - Example: **Perform Achieve Trade (PAT)** - Energy Saving Certificates in India.
2. **Voluntary Mechanisms:** Managed by **independent standards** or **non-governmental organizations**.
    - Example: **Clean Development Mechanism (CDM)** for offsetting emissions.

India's Carbon Market Framework

1. **Compliance Mechanisms: Perform Achieve Trade (PAT)**: Encourages energy-intensive industries to improve energy efficiency and trade **Energy Saving Certificates (ESCerts)**.
2. **Voluntary Mechanisms: Clean Development Mechanism (CDM)**: Allows industries and organizations to generate carbon credits by implementing **emission-reducing projects**.

Way Forward for Carbon Markets

1. **Capacity Building in Developing Countries:** Provide technical and financial support for developing nations to participate effectively in carbon markets.
2. **Strengthen Monitoring and Verification :**Establish robust mechanisms for **tracking and verifying credits** to ensure transparency.
3. **Encourage Private Sector Participation:** Incentivize businesses to invest in **green technologies** and participate in voluntary carbon markets.
4. **Align National Frameworks:** Ensure that domestic policies are in sync with **global carbon market standards** for seamless integration.
5. **Promote Equitable Market Access:** Address disparities to enable **vulnerable countries** and communities to benefit from carbon market opportunities.

India's Fossil-Based CO_2 Emissions Set to Spike by 4.6% in 2024

Syllabus Coverage- GS Paper III: Environment - Climate Change, Carbon Emissions, and Global Carbon Budget.

Context

A recent study reveals that **India's fossil-based CO_2 emissions** are projected to rise by **4.6% in 2024**, contributing significantly to global emissions and pushing temperatures closer to the **1.5°C threshold** of the Paris Agreement.

Key Findings of the Study

1. Global Carbon Emissions Trends

- **Fossil-based CO_2 emissions** globally will reach a record **37.4 billion tonnes** in 2024.
- Major contributors to global emissions (2023):
    - **China**: 31%.
    - **USA**: 13%.
    - **India**: 8%.
    - **European Union**: 7%.
- Combined, these regions account for **59%** of fossil CO_2 emissions, with the rest of the world contributing **41%**.

2. Carbon Budget

- Defined as the total CO_2 emissions permissible to keep global warming within a specified limit, e.g., **1.5°C**.

- At the current emission rate, global average temperatures are likely to exceed **1.5°C consistently within six years**.

3. Land-Use Changes

- **Deforestation emissions** decreased by **20%** over the last decade.
- **Reforestation and new forests** offset about half of the emissions from permanent deforestation globally.

4. CO_2 Sinks

- **Land and ocean sinks** absorbed around **50%** of the total CO_2 emissions, though their efficiency is negatively impacted by **climate change**.

Implications for India

1. **Global Contributor:** India contributes **8%** of global fossil CO_2 emissions, the **third-largest** contributor after China and the USA.
2. **Climate Impact:** Increased emissions risk intensifying **climate events** like heatwaves, floods, and rising sea levels, further burdening India's vulnerable population.
3. **Economic Growth vs. Sustainability:** Rapid industrialization and energy demands conflict with India's **commitment to net-zero by 2070**.
4. **Pressure on Carbon Sinks:** India's carbon sinks, like forests, face challenges from **deforestation** and **land degradation**, reducing their ability to offset emissions.

Global and National Response Mechanisms

1. Global Efforts

- **Global Carbon Project (GCP)**:
  - Established in **2001** to monitor global carbon trends.
  - Publishes budgets for **CO_2, methane (CH_4)**, and **nitrous oxide (N_2O)** emissions.
- Paris Agreement Goals:
  - Keep warming below **1.5°C** to avoid catastrophic climate impacts.

2. India's Policies and Initiatives

- **National Action Plan on Climate Change (NAPCC)**: Promotes renewable energy, afforestation, and energy efficiency.
- **Perform, Achieve, and Trade (PAT) Scheme**: Encourages energy efficiency in industrial sectors.
- **Afforestation Programs**: Aim to enhance forest carbon sinks.

Way Forward

1. **Accelerate Renewable Energy Adoption:** Scale up **solar**, **wind**, and **hydro energy projects** to reduce reliance on fossil fuels.
2. **Strengthen Forest Conservation:** Enhance afforestation efforts and implement stricter measures to combat **deforestation**.
3. **Improve Carbon Capture:** Invest in **carbon capture and storage (CCS) technologies** to reduce emissions from coal and industrial processes.
4. **Promote Sustainable Industrial Practices:** Enforce stricter emission norms for industries and incentivize **green technologies**.
5. **Public Awareness and Behavior Change:** Educate citizens on **sustainable practices** and encourage energy-efficient behaviors.

6. **Global Cooperation:** Collaborate with global initiatives like the **Global Carbon Project** to align with international climate goals.

Article 6 and Carbon Credits: Advancing Global Climate Cooperation

Syllabus Coverage

- **GS Paper III**: Environmental Conservation, Climate Change, and International Agreements.
- **GS Paper II**: Important International Institutions and Their Role in Global Climate Governance.

Context

At the **COP29 climate summit in Azerbaijan**, global leaders aim to finalize rules for an **international carbon offset trading system** under **Article 6 of the Paris Agreement**. This system is designed to strengthen international collaboration in achieving emission reductions while addressing unresolved issues from previous COP summits.

Understanding Carbon Offsets

1. **Definition**

- Mechanisms that allow governments or corporations to **offset their greenhouse gas emissions** by investing in **emission reduction projects** elsewhere.

2. **Examples of Carbon Offset Projects**

- **Renewable energy projects**: Solar and wind installations.
- **Transportation**: Promotion of electric vehicles.
- **Ecosystem restoration**: Mangrove afforestation and protection.

3. **Purpose**

- **Support climate goals**: Assists entities in meeting emission reduction targets.
- **Climate finance**: Drives investments in global mitigation projects, particularly in developing countries.

About Article 6 of the Paris Agreement

1. **Objective:** Establishes a **framework for international carbon trading** to facilitate countries in meeting their **Nationally Determined Contributions (NDCs)**.

2. **Key Mechanisms**

- **Article 6.2**: Allows **bilateral agreements** between countries for trading carbon credits.
- **Article 6.4**: Introduces a **centralized trading system** managed by the **United Nations** to regulate carbon credit transactions globally.

3. **Significance**

- Promotes **climate finance** in developing countries.
- Ensures **accountability and transparency** in emission reduction efforts.
- Prevents **double counting** of emissions and improves credit verification systems.

Decisions and Progress So Far

1. **COP26 (Glasgow):** Established a **broad framework** for carbon trading under Article 6.
2. **COP28 (Dubai)**

- Lacked consensus on operationalizing the centralized trading system.
- Unresolved issues included rules for **bilateral trading** and verification of credits.

3. **Current Status**

- **91 bilateral agreements** across **56 countries** under Article 6.2.
- Concerns persist over **double-counting** of emissions and ensuring **robust credit verification systems**.

Significance of Finalizing Article 6 Rules

1. **Boost to Climate Finance:** Unlocks **large-scale funding** for renewable energy, reforestation, and other mitigation projects in developing nations.
2. **Enhances Global Cooperation:** Facilitates **synergistic efforts** among countries to achieve global climate goals.
3. **Strengthens Climate Action Accountability:** Ensures **transparent mechanisms** to track and verify emission reductions.
4. **Mitigates Environmental Inequality:** Allows developed countries to invest in emission reduction projects in the **Global South**, promoting equity.

Challenges

1. **Double Counting:** Risk of emission reductions being counted by both buyer and seller nations.
2. **Verification Issues:** Need for robust systems to authenticate the **quality and credibility** of carbon credits.
3. **Equitable Distribution:** Ensuring that funds and benefits reach the most **vulnerable nations**.
4. **Operational Delays:** Persistent **delays in finalizing Article 6 rules**, hindering progress.

Way Forward

1. **Finalizing Rules at COP29:** Develop **clear guidelines** to avoid double counting and ensure transparency.
2. **Capacity Building for Developing Countries:** Support nations in establishing systems for **credit generation and verification**.
3. **Strengthen Centralized Trading System:** Ensure the **UN-managed system** under Article 6.4 becomes operational with robust governance.
4. **Promote Private Sector Participation:** Encourage corporations to invest in **high-quality carbon offset projects**.

Sirpur Wetland: Conservation Efforts and Ecological Significance

Syllabus Coverage- GS Paper III: Environmental Conservation, Biodiversity, and Wetland Management.

Context

The Indore Municipal Corporation (IMC) has initiated a demolition drive to remove unauthorized encroachments at the **Sirpur Ramsar site**. This action underscores the commitment to preserving the ecological integrity of this internationally recognized wetland.

About Sirpur Wetland

- **Location**: Situated in Indore, Madhya Pradesh, Sirpur Wetland spans approximately **670 acres**.
- **Historical Background**: Established over **130 years ago** by Maharaja Shivajirao Holkar, the lake was originally created to supply water to Indore and serve recreational purposes.

- **Ramsar Recognition**: In **2022**, Sirpur Wetland was designated as a **Ramsar site**, highlighting its global ecological importance.
- **Ecological Significance**:
  - **Avian Diversity**: Home to **189 bird species** across **55 families**, including both resident and migratory birds.
  - **Biodiversity**: Supports various reptiles, insects, butterflies, and fish species, contributing to its rich biodiversity.
- **Restoration Efforts**: The wetland has undergone significant restoration, transforming from a state of deterioration to a thriving urban wetland of international importance.
- **Water Sources**: Fed by three channels, with **Sukhniwas Lake** being the most significant contributor.

Conservation Challenges

- **Encroachments**: Unauthorized constructions and settlements have posed threats to the wetland's ecosystem.
- **Pollution**: Urban runoff and waste disposal have impacted water quality and habitat health.
- **Biodiversity Threats**: Habitat degradation has affected the flora and fauna dependent on the wetland.

Recent Conservation Measures

- **Demolition Drive**: The IMC's recent initiative to remove encroachments aims to restore and protect the wetland's ecological balance.
- **Community Engagement**: Involving local communities in conservation efforts to promote sustainable practices and awareness.
- **Policy Implementation**: Enforcing regulations to prevent future encroachments and ensure the wetland's protection.

Significance of Sirpur Wetland

- **Biodiversity Hotspot**: Acts as a critical habitat for numerous species, supporting ecological balance.
- **Environmental Services**: Provides flood control, groundwater recharge, and climate regulation.
- **Educational and Recreational Value**: Serves as a site for environmental education and ecotourism, fostering a connection between people and nature.

Way Forward

- **Strengthening Legal Frameworks**: Implementing stringent laws to protect wetlands from encroachments and pollution.
- **Enhancing Monitoring Systems**: Utilizing technology for real-time monitoring of wetland health and human activities.
- **Promoting Sustainable Development**: Balancing urban development with ecological conservation to ensure long-term sustainability.
- **Fostering Public Awareness**: Educating citizens about the importance of wetlands and encouraging community participation in conservation efforts.

Fingerling Conservation through Sea Ranching

Context

As part of the **artificial reef project** under the **Pradhan Mantri Matsya Sampada Yojana (PMMSY)**, the Kerala State Fisheries Department launched a **sea ranching initiative**, releasing **20,000 pompano fingerlings** off the Vizhinjam coast to enhance marine biodiversity and promote sustainable fishing.

About Fingerlings

1. **Scientific Names**
   - **Pompano**: Trachinotus blochii.
   - **Cobia**: Rachycentron canadum.
2. **Ministry Involved**
   - **Ministry of Fisheries, Animal Husbandry, and Dairying** in collaboration with the **National Fisheries Development Board (NFDB)**.
3. **Implementation under PMMSY**
   - **Budget**:
     - ₹3 crore allocated for the current phase in Thiruvananthapuram.
     - Proposed expansions include ₹29.76 crore for **southern districts** (Kollam, Alappuzha, Ernakulam, Thrissur) and ₹25.82 crore for **northern districts**.
   - **Features**:
     - Fingerlings weigh **8-10 grams**.
     - **10 lakh fingerlings** planned for release across 10 artificial reef sites.
4. **Mission Fingerling**
   - **Launch Year**: 2017.
   - **Objective**: Achieve a **Blue Revolution** by promoting fisheries development and management.
   - Target: Increase fish production from **10.79 MMT** (2014-15) to **15 MMT** by 2020-21.

Significance of Fingerlings Conservation

1. **Biodiversity Restoration:** Replenishes **marine fishery resources**, ensuring a balanced aquatic ecosystem.
2. **Sustainable Fishing:** Promotes environmentally friendly practices while supporting **coastal livelihoods**.
3. **Marine Biodiversity Enhancement:** Fingerlings improve population diversity and stability around **artificial reefs**.

Conservation Challenges for African Elephants

Context

A 52-year comprehensive study has revealed a **dramatic decline in African elephant populations**, with **savannah elephants** experiencing a **70% decrease** and **forest elephants** a **90% decline** due to habitat loss, poaching, and climate change.

About African Elephants

1. **Classification and Subspecies**
   - **African Bush Elephant** (Loxodonta africana): Found in savannas and grasslands.
   - **African Forest Elephant** (Loxodonta cyclotis): Inhabits rainforests and woodlands.
2. **Habitat**
   - Range includes **savannas**, **forests**, **grasslands**, **arid regions**, and **woodlands** like mopane and miombo.
3. **Physical Features**
   - Two **finger-like processes** at the trunk's tip.
   - Both genders possess tusks; forest elephants have **smaller, darker tusks**.
4. **Behavior and Reproduction**
   - **Social Structure**: Live in family units led by females with strong social bonds.
   - **Reproduction**:
     - Gestation period: **~2 years**.
     - Calves nurtured by mothers and **allomothers** (other females in the herd).

- **Sleep**: Remarkably low sleep duration (~**2 hours/day**).

5. **Conservation Status**
   - **African Bush Elephant**: **Endangered (IUCN)**.
   - **African Forest Elephant**: **Critically Endangered (IUCN)**.
   - Listed under **CITES Appendix I**, prohibiting international trade.

Reasons for Decline

1. **Habitat Loss:** Expansion of agriculture, urbanization, and deforestation.
2. **Poaching:** High demand for **ivory**, particularly impacting forest elephants.
3. **Climate Change:** Droughts and habitat alterations severely affect their survival.
4. **Human-Wildlife Conflicts:** Encroachments lead to increased confrontations, causing fatalities on both sides.

Conservation Efforts Needed

1. **Habitat Protection:** Preserve and expand protected areas like **national parks** and **reserves**.
2. **Anti-Poaching Measures:** Strengthen laws and penalties against poaching and illegal ivory trade.
3. **Community Engagement:** Involve local communities in elephant conservation programs to reduce conflicts.
4. **Climate Adaptation Strategies:** Develop water and food sources to combat the impact of **climate change**.
5. **Research and Monitoring:** Leverage technology like **GPS collars** and **drones** for tracking and safeguarding elephant populations.

State of the Climate 2024 Report: A Red Alert for Climate Action

Syllabus Coverage- GS Paper III: Environmental Conservation and Climate Change.

Context

The **State of the Climate 2024 Report**, published by the **World Meteorological Organization (WMO)**, highlights alarming trends in climate change, marking **2024 as potentially the warmest year** in recorded history. The report underscores the urgent need for stronger global efforts to combat climate change and mitigate its impacts.

Key Findings of the State of the Climate 2024 Report

1. Temperature and Greenhouse Gases

- Global temperatures are **1.54°C above pre-industrial levels**, with 2024 on track to be the **warmest year**.
- **Greenhouse gas concentrations** (CO_2, CH_4, N_2O) reached record highs in **2023** and continue to rise.

2. Oceans and Sea Level Rise

- **Ocean heat content** hit record levels in 2023, absorbing **3.1 million TWh of heat**.
- **Sea level rise** accelerated to **4.77 mm/year** (2014-2023), double the rate of 1993-2002.

3. Cryosphere (Polar Ice and Glaciers)

- Arctic and Antarctic sea ice extent remained **below historical averages**.
- Glaciers lost ice equivalent to **five times the water in the Dead Sea** in 2023.

4. Precipitation and Water Resources

- **2023** was the driest year for **global rivers** in 30 years.
- Despite extreme precipitation events, overall **water availability declined** globally.

5. Extreme Weather Events

- **Floods, heatwaves, droughts, and wildfires** affected millions in 2024, causing extensive **socio-economic losses**.

6. Early Warning Systems and Climate Services

- Progress in **Multi-Hazard Early Warning Systems (MHEWS)**: Adopted by **108 countries**.
- Significant gaps remain in vulnerable regions like **Africa** and **small island nations**.

7. Renewable Energy and Climate Finance

- Renewable energy capacity expanded, with advances in **wind and solar energy**.
- **Climate finance** emphasized to meet adaptation and mitigation goals.

Factors Driving Climate Change

Anthropogenic Factors

1. **Greenhouse Gas Emissions:** Fossil fuels, agriculture, and industrial activities.
2. **Land Use Changes:** Deforestation, urbanization, and agricultural expansion disrupting carbon and water cycles.
3. **Industrial Activities:** Energy-intensive processes releasing heat-trapping gases and pollutants.
4. **Transportation:** Emissions from vehicles and aviation increasing CO_2 and particulate matter levels.
5. **Waste Management:** Methane emissions from unmanaged landfills.

Natural Factors

1. **El Niño and La Niña:** Cyclical warming and cooling of ocean waters driving global weather changes.
2. **Volcanic Activity:** Eruptions releasing aerosols affecting atmospheric temperatures.
3. **Solar Variability:** Changes in solar radiation influencing Earth's energy balance.
4. **Ocean Circulation:** Variations in currents affecting heat distribution.
5. **Degradation of Natural Carbon Sinks:** Warming and deforestation reducing CO_2 absorption by forests, oceans, and soil.

Recommendations from the Report

1. Mitigation of Climate Change: Accelerate efforts to limit global warming to **1.5°C** through stronger commitments to reduce **greenhouse gas emissions**.

2. Climate Adaptation: Scale up adaptation strategies with investments in **resilient infrastructure** and **integrated water management**.

3. Early Warning Systems: Expand **MHEWS** globally, with a focus on vulnerable regions like **Africa** and small island nations.

4. Renewable Energy Expansion: Triple global **renewable energy capacity** and double energy efficiency by **2030**.

5. Strengthen Climate Services: Enhance **National Meteorological and Hydrological Services (NMHS)** for improved data collection and forecasting.

6. Cryosphere Protection: Implement policies to mitigate **glacial loss** and ensure sustainable management of **polar ecosystems**.

About the State of the Climate Report

1. **Purpose:** Provides an annual summary of **key climate indicators** and emerging trends.
2. **History:** Published annually by the **WMO** since **1993** to complement the **IPCC Assessment Reports**.
3. **Updates for COP:** Preliminary findings presented before the **UNFCCC COP** since 2016.

About the World Meteorological Organization (WMO)

1. **Overview:** An intergovernmental organization with **192 member states and territories**.
2. **Origins and Establishment**
   - Originated as the **International Meteorological Organization (IMO)** in **1873**.
   - Formed on **23rd March 1950** through the **WMO Convention**.
3. **Role**
   - Focuses on **meteorology, climate, hydrology**, and **geophysical sciences**.
   - Promotes international **cooperation** and **data exchange** for better weather and climate predictions.
4. **Headquarters:** Based in **Geneva, Switzerland**.
5. **India's Membership:** India is an **active member** of WMO.

Eurasian Otter Spotted in Pune: A Rare Discovery

Syllabus Coverage- GS Paper III: Biodiversity and Environment - Conservation of Flora and Fauna.

Context

A **rare Eurasian Otter (Lutra lutra)** was recently rescued in **Indapur, Pune District**, by the **Pune Forest Department**and **RESQ Charitable Trust**. This marks the first recorded sighting of this species in the region, highlighting its ecological significance.

About the Eurasian Otter

1. **Scientific Name- Lutra lutra**
2. **Habitat**

- Found in a variety of **aquatic ecosystems**:
  - **Streams, rivers, and lakes**.
  - **Freshwater and peat swamps**.
  - **Ocean shores and rice fields**.
- Prefers areas near **waterways** with dense vegetation for shelter.

3. **Distribution**

- **Global**: Widespread across **Europe**, **North Africa**, and **Asia**, from **Ireland to China**.
- **India**: Found in **northern, northeastern**, and **southern regions**, particularly in **cold hills and mountain streams**.

4. **Physical Features**

- **Body**: Long body, thick tail, and short legs.
- **Fur**:
  - **Outer layer**: Waterproof.
  - **Inner layer**: Provides warmth.
- **Color**: Brown upper body and cream-colored underside.
- **Whiskers**: Sensitive, aiding in navigation and hunting underwater.

5. **Diet**

- Primarily feeds on: **Fish, crustaceans, and amphibians**.
- Occasionally consumes: **Reptiles, birds, eggs, insects, and worms**.

6. **Behavior**

- **Solitary**: Primarily lives alone.
- **Family Groups**: Occasionally seen with offspring.

Conservation Status

1. **IUCN Red List- Near Threatened**: Faces habitat loss and degradation.
2. **Wildlife Protection Act (India):** Listed under **Schedule II**, ensuring protection from hunting and trade.
3. **CITES-** Included in **Appendix I**, which restricts international trade.

Significance of the Sighting in Pune

1. **Ecological Indicator:** The Eurasian Otter's presence indicates **healthy aquatic ecosystems**, as it thrives in clean water.
2. **Biodiversity Significance:** Highlights the **richness of Pune's fauna**, potentially encouraging further ecological studies in the region.
3. **Conservation Implications:** Calls for greater efforts to protect **wetland and river ecosystems**, especially against pollution and habitat encroachment.

Challenges to Eurasian Otter Conservation

1. **Habitat Loss:** Rapid urbanization, deforestation, and **wetland degradation** threaten its natural habitat.
2. **Pollution:** Contamination of water bodies reduces prey availability and impacts survival.
3. **Hunting and Poaching:** Targeted for fur and as a pest in some regions.
4. **Limited Awareness:** Lack of recognition of its ecological role hinders conservation efforts.

Way Forward

1. **Habitat Protection:** Implement stricter regulations to safeguard **wetlands** and **riverine ecosystems**.
2. **Pollution Control:** Strengthen measures to reduce **water pollution** and preserve aquatic biodiversity.
3. **Awareness Campaigns:** Educate local communities about the **importance of otters** in maintaining ecological balance.
4. **Research and Monitoring:** Conduct surveys to understand population trends and habitat requirements.
5. **Community Involvement:** Involve local stakeholders in **wetland conservation projects**.

Comb Jellies and Their Unique Abilities

Context

The discovery of **Mnemiopsis leidyi**, a comb jelly with the ability to reverse its aging process, highlights groundbreaking advancements in marine biology and aging research.

About Comb Jellies

1. **Classification:** Marine invertebrates from the phylum **Ctenophora**, distinct from jellyfish.
2. **Physical Traits**
    - Rows of cilia ("combs") for swimming, often exhibiting **bioluminescence**.
    - Capture prey using **sticky cells (colloblasts)** instead of jellyfish's stinging cells.
3. **Unique Abilities**
    - **Reverse Aging**: Mnemiopsis leidyi can regress from adulthood to a **larval stage** when under stress.
4. **Evolutionary Significance**
    - Among Earth's oldest animals, existing for **~700 million years**.

- Shares traits with the **immortal jellyfish (Turritopsis dohrnii)**, a rare group of organisms capable of biological "time travel."

Scientific Implications

1. **Aging and Longevity Research:** Insights into the molecular mechanisms of **reverse development** may inform **anti-aging therapies** and **human longevity studies**.
2. **Developmental Biology:** Offers a deeper understanding of the **regeneration and rejuvenation** pathways in multicellular organisms.

Hokersar Wetland: Challenges and Conservation in the Face of Climate Change

Syllabus Coverage- GS Paper III: Environmental Conservation and Biodiversity.

Context

The **Hokersar Wetland**, a Ramsar site in the **Kashmir Valley**, is facing ecological stress due to an **81% rainfall deficit**, leading to a sharp decline in migratory bird populations and habitat degradation.

About Hokersar Wetland

1. Location

- Situated in **Srinagar, Jammu and Kashmir**, in the **northwest Himalayan biogeographic province**.
- Receives water from the **Doodhganga River**, a tributary of the **Jhelum River**.

2. Ecological Importance

- Known as the **'Queen Wetland of Kashmir'**, it contains the last **reedbeds of Kashmir**.
- Supports **68 waterfowl species**, including:
  - **Little Cormorant**, **Common Shelduck**, and the endangered **White-eyed Pochard**.
- Acts as:
  - A pathway for migratory birds.
  - A food and spawning ground for fish.
  - A breeding and feeding habitat for migratory birds.

3. Biodiversity

- Home to over **232 bird species**.
- Hosts approximately **2 million migratory waterfowl annually**, attracting birds from **Siberia**, **Central Asia**, and **Europe**.

Current Threats to Hokersar Wetland

1. Rainfall Deficit: An **81% decrease in rainfall** has significantly reduced water levels, affecting bird habitats and fish spawning grounds.

2. Habitat Degradation: Encroachments and **illegal sewage dumping** have disrupted the natural ecosystem.

3. Illegal Mining: Mining activities have widened streambeds, leading to **silt deposition** and deterioration of the wetland's ecological balance.

Significance of Hokersar Wetland

1. **Biodiversity Hotspot:** Critical for the survival of migratory birds and various fish species.
2. **Climate Regulation:** Acts as a carbon sink, playing a role in **climate mitigation**.

3. **Livelihood Support:** Provides economic benefits to local communities through **fishing** and **ecotourism**.
4. **Flood Control:** Absorbs excess water during heavy rains, reducing flood risks in nearby areas.

Way Forward

1. Restoration of Water Flow: Ensure sustainable water flow from **Doodhganga River** and nearby streams to maintain adequate water levels.

2. Monitoring and Regulation: Strengthen regulations to prevent **encroachments**, **illegal mining**, and **sewage dumping**.

3. Climate-Resilient Conservation: Implement adaptive management strategies to mitigate the impact of **climate change** on wetland ecosystems.

4. Community Engagement: Involve local communities in conservation efforts through education and sustainable livelihood programs.

5. Biodiversity Protection: Conduct regular biodiversity surveys to monitor bird populations and overall ecosystem health.

Solar Fence Project: A Sustainable Solution to Human-Elephant Conflicts

Syllabus Coverage

GS Paper II:

- **Governance**: Role of **gram sabhas** and **panchayats** in local initiatives.
- **Policies and Interventions**: Implementation of wildlife and agricultural policies.

GS Paper III:

- **Environment and Ecology**: Sustainable approaches to mitigating **human-wildlife conflicts**.
- **Science and Technology**: Application of **renewable energy** in conservation.
- **Disaster Management**: Strategies to reduce risks from wildlife incursions.

Essay and Ethics:

- **Essay**: Sustainable development and harmonious **human-animal coexistence**.
- **Ethics**: Promoting humane methods in resolving wildlife-related challenges.

Context

Frequent crop losses in Odisha due to **elephant intrusions** prompted the launch of the **Solar Fence Project** by the Forest Department. This initiative aims to **safeguard crops**, reduce **human-wildlife conflicts**, and foster **peaceful coexistence**through sustainable and humane methods.

About the Solar Fence Project

Objective: To resolve **human-elephant conflicts** while ensuring **crop protection** and wildlife safety.

Technology

- **Solar-Powered Fence**:
  - Emits a **mild electric pulse** to deter animals without causing harm.
  - Operates via **solar panels**, charging a battery that supplies **low-voltage shocks** to the fence.

Implementation

- **Cost Sharing**:
  - **Farmers** contribute **10%** of the project cost.
  - **Orchard owners** share **50%**.
- **Proposal Submission**:
  - Submitted through **gram sabhas** or **panchayats**, involving community participation.

Impact

- Significant reduction in **elephant incursions** into farmlands.
- Improved **farmer incomes** through reduced crop losses.
- Enhanced **human-wildlife coexistence** and safety.

Significance

1. **Sustainability**
   - Promotes **renewable energy** use in wildlife management.
   - Reduces dependency on environmentally harmful methods like **trenches** or **chemical deterrents**.
2. **Community Involvement:** Encourages participatory governance by involving **local bodies** and communities.
3. **Wildlife Conservation:** Humane approach ensures elephants remain unharmed, fostering a **conservation ethos**.
4. **Economic Benefits:** Minimizes crop losses, contributing to **farmer welfare** and **rural development**.

Challenges in Implementation

1. **Financial Constraints:** Initial costs may deter smaller farmers despite **subsidized contributions**.
2. **Maintenance Issues:** Regular upkeep of solar panels and batteries may burden communities.
3. **Community Resistance:** Limited awareness and trust in new technologies among rural populations.
4. **Elephant Adaptation** Over time, elephants might adapt to bypass the fences, reducing effectiveness.

Way Forward

1. **Capacity Building:** Train local communities in **maintenance and operation** of solar fences.
2. **Enhanced Funding:** Provide **government subsidies** or low-interest loans to support wider adoption.
3. **Awareness Campaigns:** Educate farmers on the **benefits** of the project and wildlife conservation.
4. **Monitoring and Innovation:** Continuously monitor the project's effectiveness and integrate **AI-driven wildlife tracking systems**.
5. **Replication Across Regions:** Extend the project to other areas with frequent **human-animal conflicts**.

NMCG Approves Key Biodiversity Projects for River Ganga Conservation

Syllabus Coverage

- **GS Paper III**: Conservation, Environmental Pollution, and Degradation.
- **GS Paper II**: Government Policies and Interventions.

Context

The **Executive Committee of the National Mission on Clean Ganga (NMCG)** has approved a series of projects aimed at conserving the biodiversity of **River Ganga** and its aquatic ecosystem.

Key Projects Approved

1. Environmental Flow Assessment

- Rivers Covered: Chambal, Son, Damodar, and Tons.
- **Objective**: Evaluate water flow required to sustain biodiversity and ecosystem services.

2. Turtle Conservation in Uttar Pradesh

- **Focus**:
  - Rehabilitation of endangered turtle species.
  - Reintroduction of three highly threatened species.

3. National Chambal Sanctuary Monitoring

- **Tool**: Establishment of a **Spatial Monitoring and Reporting Tool** to track conservation efforts.

4. Gangetic Dolphin Protection

- **Advancing Rescue Systems**:
  - Development of a specialized rescue vehicle, **Dolphin Ambulance**, for assisting stranded dolphins.
  - Raising awareness and training communities for dolphin conservation.

About the Gangetic Dolphin (Platanista gangetica)

Habitat: Found in **Ganga-Brahmaputra-Barak river system** (India, Nepal, Bangladesh).

Characteristics: Freshwater species, blind, hunts using **ultrasonic sound**.

Threats

1. **Entanglement in fishing gear**.
2. **Poaching** for dolphin oil.
3. **Habitat destruction** due to development projects.
4. **Pollution**: Industrial waste, pesticides, and domestic sewage.

Conservation Status

- **IUCN**: Endangered.
- **CITES**: Appendix I.
- **Wildlife Protection Act (India)**: Schedule I.

Conservation Initiatives for Gangetic Dolphin

1. **National Aquatic Animal:** Declared as **India's National Aquatic Animal** to emphasize its protection.
2. **Project Dolphin:** Launched to conserve **Ganges River Dolphins** and their riverine ecosystems.
3. **Financial Assistance to States:** Included as one of 22 critically endangered species under the **Development of Wildlife Habitats** scheme.
4. **Protected Areas:** Important habitats notified as **protected areas**, such as the **Vikramshila Dolphin Sanctuary** in Bihar.

Significance of These Projects

1. **Enhanced Biodiversity Conservation:** Targeted efforts to conserve endangered species like turtles and dolphins.
2. **Sustainable River Management:** Maintaining **environmental flow** ensures ecosystem health and supports livelihoods.

3. **Community Participation:** Awareness and capacity-building initiatives promote local involvement in conservation efforts.
4. **Support for National Mission:** Aligns with the goals of **Namami Gange Programme** and India's commitment to **sustainable river management**.

Way Forward

1. **Strengthening Monitoring Systems:** Expand spatial tools for effective tracking of aquatic biodiversity.
2. **Policy Integration:** Link conservation projects with broader development policies for holistic river management.
3. **Increased Funding:** Ensure adequate financial resources for project implementation and capacity building.
4. **Collaborative Approach:** Foster partnerships between governments, NGOs, and local communities for sustainable conservation.

BIOTECHNOLOGY & HEALTH

First Successful Clinical Demonstration of RNA Editing in Humans

Syllabus Coverage- GS Paper III: Science and Technology - Developments and Their Applications in Human Health.

Context

Wave Life Sciences, a **US-based biotechnology company**, has achieved the first **clinical demonstration of RNA editing**in humans. This breakthrough targets **alpha-1 antitrypsin deficiency (AATD)**, a genetic disorder affecting the liver and lungs, showcasing RNA editing as a promising therapeutic approach.

Alpha-1 Antitrypsin Deficiency (AATD)

1. **What is AATD?**

- A genetic disorder caused by the accumulation of the **α-1 antitrypsin protein**, which damages the liver and lungs.

2. **Role of RNA Editing in Treating AATD**

- Corrects errors in **messenger RNA (mRNA)** to restore normal protein production.

About RNA Editing

1. **Definition:** RNA editing modifies **genetic information** on RNA sequences by **inserting, deleting, or substituting** nucleotides.
2. **Technique Used**

- **Adenosine Deaminase Acting on RNA (ADAR)**:
  - An enzyme that alters **adenosine** in mRNA to **inosine**, which mimics **guanosine**.
  - Paired with **guide RNA (gRNA)**, which directs editing machinery to specific mRNA regions for modification.

3. **Process**

- RNA has four building blocks:
  - **A** (Adenine), **G** (Guanine), **U** (Uracil), **C** (Cytosine).

- ADAR converts **adenosine (A)** to **inosine (I)**.
- Inosine acts as guanosine (G), triggering a **cellular response** to correct mismatches.
- This correction restores mRNA's function, enabling cells to produce normal proteins.

Comparison: RNA Editing vs DNA Editing

Aspect	RNA Editing	DNA Editing
Form of Change	Temporary and reversible.	Permanent and irreversible.
Safety	Safer due to its transient nature.	Risk of permanent errors.
Immune Reactions	Lower risk as it uses natural human enzymes.	Higher risk due to bacterial-derived tools.

Challenges in RNA Editing

1. **Lack of Specificity: ADAR enzymes** may cause unintended edits, leading to potential side effects.
2. **Transient Effects:** RNA editing is **not permanent**, necessitating **repeated treatments** to sustain benefits.
3. **Nascent Stage:** RNA editing technologies are still in the **early stages of clinical application**.

Significance of the Breakthrough

1. **Therapeutic Potential:** Demonstrates RNA editing as a viable therapy for **genetic disorders** like AATD.
2. **Safety and Flexibility:** Compared to DNA editing, RNA editing is safer, making it suitable for **clinical applications**.
3. **Innovative Healthcare Applications:** Could pave the way for treatments of other diseases caused by **genetic mutations**.

Way Forward

1. **Enhancing Specificity:** Develop more precise **guide RNA (gRNA)** to minimize off-target effects.
2. **Extending Therapeutic Duration:** Explore ways to **prolong RNA editing effects** for fewer treatment cycles.
3. **Scaling Clinical Trials:** Conduct large-scale trials to validate safety and efficacy across diverse populations.
4. **Expanding Applications:** Investigate RNA editing for treating **other genetic and rare disorders**.

Antimicrobial Resistance (AMR): A Growing Global Threat

Syllabus Coverage

- **GS Paper II**: Issues Relating to Health, Governance, and Social Sector Services.
- **GS Paper III**: Science and Technology - Developments and Their Applications in Human Health.

Context

Antimicrobial Resistance (AMR) poses a severe challenge to human, animal, and environmental health worldwide, including India. Despite advances in medical science, AMR risks derailing global health progress, with alarming projections of **10 million deaths annually by 2050** if left unchecked.

What is Antimicrobial Resistance (AMR)?

1. **Definition:** AMR occurs when microorganisms such as **bacteria, viruses, fungi, and parasites** develop resistance to antimicrobial drugs, rendering treatments ineffective.
2. **Impact**

- Prolonged illnesses and increased mortality.
- Higher healthcare costs due to ineffective treatments.
- Risks to public health systems globally.

Causes of AMR

1. **Overuse of Antibiotics**
   - Unregulated sale and over-the-counter availability.
   - Over-prescription for minor or non-bacterial infections.
2. **Underuse or Misuse:** Non-adherence to prescribed dosages or courses of antibiotics.
3. **Industrial Agricultural Practices**
   - Use of antibiotics as **growth promoters** in livestock, fisheries, and poultry.
   - Poor waste management exacerbating environmental AMR.
4. **Lack of Diagnostic Infrastructure:** Limited facilities for proper diagnosis leading to inappropriate antibiotic use.
5. **Inadequate Training:** Healthcare providers often lack knowledge about rational antibiotic use.
6. **COVID-19 Pandemic Misuse:** Rampant and indiscriminate use of antibiotics during the pandemic intensified AMR.

India's Approach to Tackling AMR

1. **National Action Plan (NAP):** Launched in **2017**, focusing on rational antibiotic use and AMR surveillance.
2. **AMR Surveillance and Research Network (AMRSN):** Established by **ICMR** in **2013** to monitor resistance patterns in **30 tertiary hospitals**.
3. **One Health Approach:** Recognizes the interconnected health of humans, animals, and the environment.
   - Initiatives include the **Integrated One Health Surveillance Network**.
4. **National One Health Mission:** Approved in **2022**, targeting AMR, zoonotic diseases, and environmental health.
5. **Policy Guidelines: NCDC** developed national guidelines for **treatment and infection control**.
6. **Zoonotic Disease Programs:** Includes the **National Programme for Prevention and Control of Zoonoses** under One Health.

Challenges in Addressing AMR

1. **Lack of Behavioural and Social Science Data:** Limited understanding of **antibiotic usage patterns** at the community level.
2. **Structural Disparities:** Unequal access to healthcare, especially in **rural and underserved regions**.
3. **Insufficient Community Engagement:** Awareness campaigns on AMR are poorly implemented.
4. **Inadequate Workforce Training:** Outdated curricula and lack of inter-sectoral training for professionals.
5. **Surveillance Gaps:** Inconsistent data collection at community and tertiary levels limits effective planning.

Way Forward

1. **Strengthen Surveillance Systems:** Expand monitoring to include **community-level data** for more effective health planning.
2. **Enhance Public Awareness:** Implement targeted campaigns on **antibiotic stewardship** and AMR risks.
3. **Policy Implementation:** Enforce stricter regulations on **over-the-counter antibiotic sales**.
4. **Inter-Sectoral Collaboration:** Strengthen the **One Health approach** to integrate human, animal, and environmental sectors.
5. **Update Curricula and Training:** Revise professional training to include AMR awareness and **integrated health strategies**.
6. **Focus on Resource Allocation :** Ensure equitable distribution of resources for implementing AMR strategies effectively.

Strengthening Animal Health Security in India for Pandemic Preparedness

Syllabus Coverage

- **GS Paper II**: Government Policies and Interventions for Development in Health Sector.
- **GS Paper III**: Disaster Management, Science and Technology, and Their Applications in Health.

Context

The Government of India has launched the **"Animal Health Security Strengthening in India for Pandemic Preparedness and Response" initiative** to address **animal health security** as a preventive strategy against potential pandemics. This initiative reflects India's proactive approach to **zoonotic disease management** and aligns with global efforts to strengthen health security.

About the Initiative

1. **Launch Details**

- **Launch Date**: October 25, 2024.
- **Approval Source**: Pandemic Fund, created under **G20 Indonesian Presidency (2022)**.

2. **Responsible Ministry**

- **Ministry of Fisheries, Animal Husbandry, and Dairying**.

3. **Primary Objectives**

- Strengthen the **capacity to prevent, detect, and respond** to animal health threats.
- Minimize the risk of **zoonotic disease transmission** from animals to humans.

4. **Implementing Agencies**

- **Asian Development Bank (ADB)**.
- **World Bank**.
- **Food and Agriculture Organisation (FAO)**.

5. **Timeline and Funding**

- **Completion Date**: August 2026.
- **Funding**: $25 million allocated from the **Pandemic Fund** under the G20 initiative.

Key Features of the Initiative

1. **Disease Surveillance and Early Warning Systems: Strengthening surveillance networks** to identify emerging animal health threats promptly.

2. **Laboratory and Vaccine Facility Upgrades**

- Modernize **laboratory networks** to improve diagnostic capabilities.
- Expand **vaccine manufacturing facilities** for rapid response to animal diseases.

3. **Interoperable Data Systems:** Build **integrated data platforms** for enhanced analytics and information sharing.
4. **Capacity Building and Institutional Development**

- Train **human resources** in advanced diagnostic and disease management techniques.
- Address **institutional gaps** in animal health governance.

5. **Regional Cooperation:** Foster **cross-border collaboration** to manage transboundary diseases effectively.

Significance of the Initiative

1. **Pandemic Prevention:** Early detection of animal diseases helps prevent **zoonotic outbreaks** like **COVID-19** and **Nipah virus**.
2. **Health Security:** Enhances India's **One Health approach**, integrating human, animal, and environmental health for pandemic preparedness.
3. **Capacity Building:** Strengthened laboratories and **trained personnel** improve India's ability to tackle animal diseases.
4. **Global Alignment:** Supports international goals such as **WHO's Global Health Security Agenda** and **FAO's Animal Health Strategy**.
5. **Economic Impact:** Reduces economic losses in **livestock and poultry industries** caused by animal diseases.

Challenges

1. **Resource Constraints:** Limited funding and infrastructure in rural areas may hinder implementation.
2. **Coordination Gaps:** Ensuring synergy among multiple implementing agencies like **ADB**, **World Bank**, and **FAO** can be complex.
3. **Regional Cooperation Barriers:** Political and logistical challenges in coordinating cross-border disease management.
4. **Data Integration Issues:** Building robust, interoperable data systems across states and institutions requires significant effort.

Way Forward

1. **Enhanced Funding Mechanisms:** Mobilize additional resources through **public-private partnerships**.
2. **Capacity Strengthening at Grassroots:** Focus on training **local veterinary staff** and improving rural health infrastructure.
3. **One Health Implementation:** Integrate animal health initiatives with human health and environmental monitoring systems.
4. **Regional Collaboration Frameworks:** Establish formal agreements with neighboring countries for **cross-border disease management**.
5. **Technology Integration:** Leverage **AI** and **Big Data** for predictive analytics in disease outbreak forecasting.

Biotechnology Research and Innovation Council (BRIC)

Context

The **Biotechnology Research and Innovation Council (BRIC)** recently completed one year since its establishment by the **Department of Biotechnology (DBT)** under the **Ministry of Science and Technology**.

About BRIC

- **Established**: By merging **14 Autonomous Institutions (AIs)** under the Department of Biotechnology.
- **Objective**: Centralized governance for advancing **biotechnology research** and innovation.

Objectives of BRIC

1. **Promoting Cutting-Edge Research:** Aligns research with **national priorities** such as healthcare, agriculture, and climate change.
2. **Fostering Innovation:** Encourages **cross-institutional collaboration** to translate research into applications.
3. **Developing Indigenous Technologies:** Focuses on building **self-reliant technologies** and enhancing **domestic capabilities**.
4. **Unified Governance:** Implements a **centralized funding mechanism** using **intra-mural core grants** to support its institutions.

Significance of BRIC

1. **Streamlined Research Ecosystem:** Integrates resources and expertise from multiple institutions under a single framework.
2. **Boosts Innovation and Translation:** Bridges the gap between **research outcomes** and their **practical applications**.
3. **Supports National Missions:** Contributes to national goals such as **Aatmanirbhar Bharat** and **Digital India**.
4. **Encourages Collaboration:** Promotes **synergies among researchers**, fostering multidisciplinary innovation.

Decline in Out-of-Pocket Expenditure (OOPE): A Step Toward Inclusive Healthcare

Syllabus Coverage- GS Paper II: Issues Relating to Health, Government Policies, and Social Sector Services.

Context

The **National Health Accounts (NHA) 2021-22 data** reveals a substantial decline in **Out-of-Pocket Expenditure (OOPE)** on healthcare. This progress is attributed to **increased government spending**, **enhanced public health infrastructure**, and **expanded health insurance coverage**, reflecting India's commitment to Universal Health Coverage (UHC).

What is Out-of-Pocket Expenditure (OOPE)?

1. **Definition-** OOPE refers to **direct payments** made by individuals for healthcare services, including consultations, medicines, diagnostics, and hospitalizations.
2. **Impact**

- High OOPE disproportionately affects **low-income families**, leading to:
  - Financial hardships.
  - Accumulation of debt.
  - Reduced access to essential healthcare services.

Trends in OOPE

1. **Decline in OOPE as a Percentage of Total Health Expenditure (THE)**: Steady reduction due to increased **government investments** and **health insurance programs**.
2. **Per Capita Health Expenditure**: Tripled from **₹1,108 in 2014-15** to **₹3,169 in 2021-22**.

Reasons for Decline in OOPE

1. **Increased Government Health Expenditure (GHE)**

- **Rise in GHE as a Percentage of GDP**:

    - From **1.13% (2014-15)** to **1.84% (2021-22)**.
- **Impact**: Improved affordability and availability of public healthcare services.
- **Example**: Investments in **rural healthcare centres**.

2. **Expansion of Social Security Expenditure (SSE)**

- **Growth in SSE**: From **5.7% to 8.7% of THE** (2014-15 to 2021-22).
- **Impact**: Shielded vulnerable populations from catastrophic health costs.
- **Example**: **Rashtriya Swasthya Bima Yojana**.

3. **Government-Funded Insurance Schemes**

- Programs like **Ayushman Bharat PM-JAY** provide comprehensive coverage.
- **Impact**: Reduced reliance on personal savings for medical expenses.
- **Example**: PM-JAY covering **50 crore beneficiaries**.

4. **Focus on Public Health Infrastructure**

- Investments in **primary healthcare centres**, workforce training, and diagnostics.
- **Example**: Establishment of healthcare centres in underserved regions.

5. **Pandemic-Driven Investments**

- **Covid-19 Response**: Enhanced funding for ICU facilities, ventilators, and emergency services.
- **Impact**: Strengthened long-term affordability in healthcare.

Implications of Reduced OOPE

1. **Improved Healthcare Accessibility**

- Affordable services encourage timely medical interventions, especially in rural areas.
- **Example**: Free diagnostics in government hospitals.

2. **Stronger Public Healthcare System**

- Reduced OOPE enables public health systems to serve broader populations.
- **Example**: Vaccination drives with expanded reach.

3. Better Health Outcomes

- **Preventive care** reduces the severity of illnesses and treatment costs.
- **Example**: Regular screenings for non-communicable diseases (NCDs).

4. **Increased Financial Stability**

- Families can allocate resources to essentials like **education** and **nutrition**.
- **Example**: Low-income families spending less on emergency healthcare.

5. **Foundation for Universal Health Coverage (UHC)**

- Strengthened public funding supports equitable healthcare access for marginalized groups.
- **Example**: Affordable healthcare services for rural and economically weaker populations.

Way Forward

1. **Expand Health Insurance Coverage:** Broaden access to government-funded programs like Ayushman Bharat.
2. **Strengthen Primary Healthcare:** Focus on rural healthcare infrastructure and **training healthcare workers**.
3. **Public Awareness Campaigns:** Educate citizens about **health schemes** and **preventive healthcare practices**.
4. **Leverage Digital Health Solutions:** Utilize technology for **cost-effective healthcare delivery** (e.g., telemedicine).
5. **Focus on NCDs:** Increase investments in the **prevention and management** of non-communicable diseases.

'PPP plus PPP' Model to Combat Diabetes

Syllabus Coverage

- **GS Paper II**: Health, Government Policies, and International Relations.
- **GS Paper III**: Science & Technology – Biotechnology and Public-Private Partnerships.

Context

On **World Diabetes Day (14th November)**, the **Ministry of Science & Technology** introduced the **'PPP plus PPP' model**, a collaborative initiative uniting **public and private sectors** domestically and internationally to address **India's diabetes crisis**.

Understanding the 'PPP plus PPP' Model

1. **Definition:** A **two-tiered collaboration model**:
    - **Domestic Level**: Public and private sectors partner to enhance **healthcare infrastructure** and service delivery.
    - **International Level**: Engagement with **global counterparts** to exchange expertise, resources, and innovations.
2. **Objective**
    - Strengthen India's **diabetes prevention, diagnosis, and treatment** capabilities.
    - Address gaps in **healthcare access** for diabetes management.

About Diabetes Mellitus (DM)

1. **Definition:** A **chronic metabolic disease** characterized by **elevated blood glucose levels (hyperglycemia)** due to insufficient insulin production or usage.
2. **Types of Diabetes**
    - **Type 1 Diabetes**:
        - Known as **juvenile diabetes** or **insulin-dependent diabetes**.
        - An **autoimmune disorder** where the immune system destroys **insulin-producing cells** in the pancreas.
    - **Type 2 Diabetes**: The most common form, occurring when the body becomes resistant to insulin or doesn't produce enough.
    - **Gestational Diabetes**: Develops during **pregnancy** and may lead to complications for both mother and child.
3. **Symptoms and Risks**
    - Symptoms: Glucose loss through urine, formation of **ketone bodies**.
    - Complications: Heart, blood vessel, kidney, eye, and nerve damage.

Global and National Prevalence

1. **Global Scenario**
   - Around **830 million people** globally suffer from diabetes.
   - The majority reside in **low- and middle-income countries**.
2. **India's Burden**
   - **212 million people** in India have diabetes, with a significant treatment gap:
     - **64 million men** and **69 million women** remain untreated, leading to higher risks of severe complications.

Insulin: The Lifesaving Hormone

1. **Definition: Insulin** is a peptide hormone secreted by **β-cells of the pancreas**, regulating glucose levels.
2. **Functions:** Acts on **hepatocytes** (liver cells) and **adipocytes** (fat cells) to enhance glucose uptake and utilization.
3. **Production:** Modern-day insulin is primarily **recombinant human insulin**, produced using **E. coli** or **Saccharomyces cerevisiae** (yeast).

Challenges in Diabetes Management

1. **Treatment Gap:** Over **50% of people with diabetes** lack proper treatment.
2. **Economic Burden:** High prevalence strains public and private healthcare resources.
3. **Complication Risks:** Untreated diabetes increases the risk of **cardiovascular diseases**, **renal failure**, and **vision loss**.
4. **Global WHO Target: Halt the rise in diabetes and obesity by 2025**.

Significance of 'PPP plus PPP' Model

1. **Infrastructure Development:** Enhanced facilities for **diagnosis, treatment, and management**.
2. **International Collaboration:** Exchange of **best practices** and **advanced technologies**.
3. **Access and Affordability:** Improve access to **affordable insulin** and diabetes management solutions.
4. **Research and Innovation:** Focus on **biotechnology solutions**, including improved **insulin production** and **diagnostic tools**.

Way Forward

1. **Strengthen Public Awareness:** Conduct national campaigns to raise awareness about **diabetes prevention and management**.
2. **Invest in Technology:** Promote **digital healthcare** solutions, such as mobile applications for **diabetes monitoring**.
3. **Policy Support:** Expand subsidies for **insulin** and essential diabetes medications.
4. **Focus on Prevention:** Encourage **healthy lifestyles**, including **balanced diets** and **physical activity**, to reduce Type 2 diabetes prevalence.
5. **Leverage Artificial Intelligence:** Utilize **AI-based diagnostics** and predictive tools for early detection and personalized care.

SCIENCE & TECHNOLOGY

Celebrating a Century of Bose-Einstein Statistics: Legacy and Relevance

Syllabus Coverage- GS Paper III: Science and Technology – Contributions of Indian Scientists, Quantum Physics, and Emerging Technologies.

Context

The **Centenary Celebrations of Bose-Einstein Statistics (B-E Statistics)** were inaugurated by the **Science and Technology Minister**, marking 100 years since **Satyendra Nath Bose's** groundbreaking proposal in **1924**, which revolutionized quantum physics.

What is Bose-Einstein (B–E) Statistics?

1. **Definition**
   - **B-E Statistics** describes how a collection of **non-interacting, indistinguishable particles** occupies discrete energy states at **thermodynamic equilibrium**.
2. **Key Features**
   - **Particles Governed**: Particles following this principle are called **Bosons**, named after Satyendra Nath Bose.
   - **Spin Values**: Bosons are particles with **integer spins** (e.g., 0, 1, 2). Examples include:
     - **Photon** (light particle).
     - **Gluon** (carrier of strong force).

Historical Context and Contribution

1. **Satyendra Nath Bose's Breakthrough (1924):** Proposed a **new quantum statistical model** for particles like photons.
2. **Collaboration with Albert Einstein:** Einstein extended Bose's work, leading to the formalization of **Bose-Einstein Statistics**.

Key Applications and Significance

1. Quantum Physics and Technology

- B–E Statistics laid the foundation for the **Quantum Revolution**:
  - **First Revolution (20th Century)**: Led to transformative technologies like:
    - **Lasers**, **transistors**, **Magnetic Resonance Imaging (MRI)**, and **semiconductors**.
  - **Second Revolution (21st Century)**: Driving innovations in:
    - **Quantum computing**, **quantum cryptography**, and **quantum sensing**.

2. Discovery of Bose-Einstein Condensate (BEC)

- A **fifth state of matter**, achieved when particles are cooled to near **absolute zero (-273.15°C)**.
- **Properties**:
  - Exhibits quantum behavior at a macroscopic scale.
  - Useful for studying **quantum phenomena**, superfluidity, and superconductivity.

3. Advancement in Fundamental Science

- Enhanced understanding of **particle behavior**, leading to insights into **cosmology**, **nuclear physics**, and **high-energy particle physics**.

Relevance for India

1. **Scientific Legacy:** Recognizes **Satyendra Nath Bose** as one of India's greatest contributions to modern science.
2. **Emerging Quantum Technologies: India's Quantum Mission** aims to leverage Bose's principles in developing **quantum computers** and **secure communication systems**.
3. **Global Collaboration:** Strengthens India's role in **international quantum research** and innovation.

Way Forward

1. **Promoting Research:** Encourage further studies on **Bose-Einstein Condensates** and their applications in modern technologies.
2. **Quantum Education:** Integrate Bose's contributions into **academic curricula** to inspire the next generation of physicists.
3. **Policy Support:** Boost funding and infrastructure for **quantum research** under initiatives like the **National Quantum Mission**.
4. **Global Leadership:** Position India as a leader in **quantum technologies**, building on its scientific legacy.

India's Rising Star in QS World University Rankings: Asia 2025

Syllabus Coverage

- **GS Paper II**: Issues Relating to Education and Human Resources.
- **GS Paper III**: Science and Technology, and Their Applications in Education.

Context

The **QS World University Rankings: Asia 2025** highlights India's substantial progress in higher education. With **seven institutions in the top 100** and **two in the top 50**, India demonstrates a growing focus on **academic and research excellence**. Key metrics such as **"Papers per Faculty"** and **"Staff with PhD"** underscore India's advancements in research and teaching quality.

Key Highlights of QS World University Rankings: Asia 2025

1. **Coverage- Total Institutions**: Assessed 984 universities across **25 Asian countries**.
2. **Top Indian Institutions in Rankings**

- **IIT Delhi**: Ranked **44th**, India's highest, with a **99% employer reputation** score.
- **IIT Bombay**: Ranked **48th**, scoring **99.5% in employer reputation**.
- **University of Delhi**: Climbed to **81st**, achieving **96.4% in International Research Network**.
- Other Institutions in the Top 100:
  - **IIT Madras**: 56th.
  - **IIT Kharagpur**: 60th.
  - **IISc Bangalore**: 62nd.
  - **IIT Kanpur**: 67th.

3. **Emerging Leaders**

- **University of Petroleum and Energy Studies (UPES)**: Jumped **70 places** to rank **148th**.

4. Excellence in Research

- **Anna University**: Scored a perfect **100 in "Papers per Faculty"**.
- **Staff with PhD**:
  - 15 Indian universities scored over **99%.**
- **Faculty-Student Indicator**:
  - **North Eastern Hill University** and **University of Agricultural Sciences, Bangalore** scored a perfect **100**.

5. **Decade of Growth:** India's representation grew from **11 institutions in 2015** to **46 institutions in 2025**, marking a **318% increase**.

About QS World University Rankings

1. **Publishing Organization:** Published annually by **Quacquarelli Symonds (QS)**, a global analytics firm headquartered in London.
2. **Evaluation Framework:** Assesses universities based on **four core dimensions**:
   - **Research**.
   - **Teaching**.
   - **Employability**.
   - **International Outlook**.
3. **Performance Indicators and Weightage**

- **Academic Reputation (40%)**: Based on opinions of academic experts on teaching and research quality.
- **Faculty/Student Ratio (20%)**: Measures teaching capacity via student-to-teacher ratio.
- **Citations Per Faculty (20%)**: Evaluates research impact through citations over five years.
- **Employer Reputation (10%)**: Surveys employers to gauge graduates' employability.
- **International Faculty (5%)**: Tracks teaching staff diversity.
- **International Students (5%)**: Reflects an institution's global appeal.

Significance of India's Performance in Rankings

1. **Global Recognition:** Higher rankings enhance India's **educational reputation** on the international stage.
2. **Research and Teaching Excellence:** Success in metrics like **"Papers per Faculty"** and **"Staff with PhD"** reflects India's progress in research and academic quality.
3. **Increased Accessibility:** Improved rankings make Indian institutions attractive to **international students and faculty**.
4. **Boost to Employability:** High scores in **Employer Reputation** highlight the quality of Indian graduates in the global job market.

Way Forward

1. **Focus on Research and Innovation**

- Encourage **collaborative research** with global institutions.
- Provide **increased funding** for research infrastructure.

2. **Strengthen Teaching Quality**

- Enhance the **student-to-teacher ratio** through better recruitment.
- Upskill faculty through **international exposure** and **training programs**.

3. **Promote Globalization in Education**

- Attract **international students and faculty** to improve diversity metrics.
- Foster partnerships with **global universities** for joint programs.

4. **Encourage Regional Representation**

- Support universities in **tier-2 and tier-3 cities** to participate in global rankings.

Antariksha Abhyas – 2024: India's First Space Exercise

Syllabus Coverage

- **GS Paper III**: Science and Technology - Developments and Their Applications in Defence.
- **GS Paper II**: Government Policies and Interventions in Defence and Security.

Context

India launched its first-ever **space exercise**, **Antariksha Abhyas – 2024**, to address growing challenges to space-based assets and ensure seamless integration of space capabilities with military operations. This initiative underscores India's commitment to safeguarding its strategic interests in space.

About Antariksha Abhyas – 2024

1. **Organized by:** Conducted by the **Defence Space Agency** under the **Headquarters Integrated Defence Staff**.
2. **Location:** Held in **New Delhi**.
3. **Purpose**

- **War-game threats** to and from space-based assets and services.
- Enhance understanding of **operational dependency on space systems**.
- Identify **vulnerabilities** in space operations during potential disruptions or denials.

4. **Participants**

- **Defence Space Agency** and allied units.
- Tri-services: Army, Navy, Air Force.
- **Defence Cyber Agency**, **Defence Intelligence Agency**, and **Strategic Forces Command**.
- Representatives from **ISRO** and **DRDO**.

Significance of Antariksha Abhyas – 2024

1. **Securing Space-Based Assets:** Addresses the rising threats to **satellite systems** critical for communication, navigation, and surveillance.
2. **Strategic Preparedness:** Enhances India's readiness in the increasingly **contested and competitive space domain**.
3. **Innovation and Collaboration:** Strengthens collaboration between **ISRO**, **DRDO**, academia, and the Armed Forces.
4. **National Security:** Establishes a robust framework to protect India's **national security interests** in space.

About the Defence Space Agency

1. **Headquarters:** Located in **Bengaluru, Karnataka, India**.
2. **Purpose:** Operates **space warfare and satellite intelligence assets** for the Indian Armed Forces.

- Draws personnel from the **Army, Navy, and Air Force**.

3. **Historical Background**

- Originates from the **Naresh Chandra Task Force (2012)** recommendations: Advocated for tri-service commands in **cyber**, **aerospace**, and **special operations**.
- Approved in **2018** by Prime Minister **Narendra Modi** during the Combined Commanders' Conference.

4. **Integrated Facilities**

- Subsumed the **Defence Imagery Processing and Analysis Centre (Delhi)** and the **Defence Satellite Control Centre (Bhopal)**.

Strategic Importance of Space for India

1. **Space as a Strategic Domain**
   - Increasing dependence on **space-based systems** for military operations, communication, and surveillance.
   - Ensures India's position in **global space power dynamics**.
2. **Dual-Use Capabilities:** Satellites offer applications for both **civilian purposes** (disaster management, navigation) and **military operations**(intelligence and reconnaissance).
3. **Addressing Space Threats:** Countering the risks posed by **anti-satellite weapons (ASAT)**, jamming, and cyber threats to space infrastructure.
4. **Regional Leadership:** Strengthens India's leadership in space technologies in South Asia and beyond.

Way Forward

1. **Strengthen Collaboration:** Enhance partnerships with **ISRO**, **DRDO**, and private players in space technology.
2. **Capacity Building:** Train personnel in **space warfare strategies** and satellite system operations.
3. **Invest in R&D:** Accelerate research in **anti-satellite defense**, **satellite resilience**, and **cybersecurity measures** for space systems.
4. **Global Partnerships:** Collaborate with friendly nations for **space situational awareness** and shared security protocols.
5. **Expand the Role of Defence Space Agency:** Integrate advanced capabilities like **quantum communication** and **AI-driven space surveillance**.

Ministry of Science and Technology Launches 'Operation Dronagiri' and Geospatial Data Interface

Syllabus Coverage

- **GS Paper II**: Governance – Policies and Schemes.
- **GS Paper III**: Science & Technology – Applications of Geospatial Data and Technology.

Context

The **Ministry of Science and Technology** has launched **Operation Dronagiri** and the **Integrated Geospatial Data Sharing Interface (GDI)** to promote the use of **geospatial technologies** and liberalize geospatial data for public benefit.

What is Geospatial Data?

1. **Definition:** Information describing **objects, events, or features** with a location on or near the Earth's surface.

2. **Examples- Satellite imagery**, **census data**, and **social media data**.
3. **Significance:** Accepted as **critical national infrastructure** and a valuable resource for **decision-making and development**.

About Operation Dronagiri

1. **Purpose:** To demonstrate the potential of **geospatial technologies** to improve citizens' quality of life and enhance ease of doing business.
2. **Implementation:** A **pilot project** under the **National Geospatial Policy 2022**, managed by the **Geospatial Innovation Cell** of the Department of Science and Technology.
3. **First Phase**
    - States: **Uttar Pradesh, Haryana, Assam, Andhra Pradesh, and Maharashtra**.
    - Sectors for Pilot Use Cases:
        - **Agriculture**: Enhancing crop management using geospatial tools.
        - **Livelihoods**: Improving rural development initiatives.
        - **Logistics and Transport**: Streamlining infrastructure and supply chains.

About Integrated Geospatial Data Sharing Interface (GDI)

1. **Objective:** Build a platform for seamless **spatial data sharing** with advanced **data exchange protocols** and **privacy-preserving features**.
2. **Significance**
    - Facilitates **data-driven decision-making** for public benefit.
    - Promotes **responsible use** of geospatial data across sectors.

National Geospatial Policy 2022

1. **Vision**
    - Position India as a **global leader** in the geospatial sector.
    - Develop a **national framework** to enable easy availability of geospatial data.
2. **Key Features**
    - **Institutional Framework**:
        - **Geospatial Data Promotion and Development Committee (GDPDC)** as the apex body.
        - **Survey of India** designated as the nodal agency for geospatial data.
    - Introduction of the **National Digital Twin Strategy** to create virtual replicas of physical assets.
    - Development of **Geospatial Knowledge Infrastructure** to facilitate data use and innovation.

Significance of the Initiatives

1. **Data Democratization:** Liberalizes access to geospatial data, enabling public and private entities to innovate.
2. **Improved Governance:** Supports efficient decision-making in **infrastructure**, **disaster management**, and **urban planning**.
3. **Economic Growth:** Boosts the geospatial sector's contribution to India's **GDP** through innovations and investments.
4. **Enhanced Public Services:** Application in sectors like **health**, **agriculture**, and **transport** to improve service delivery.

Way Forward

1. **Capacity Building:** Train professionals and stakeholders in geospatial technologies to maximize their potential.

2. **Strengthen Data Security:** Ensure robust **data privacy** and **security protocols** to protect sensitive information.
3. **Private Sector Participation:** Encourage private investments and collaborations to enhance geospatial innovation.
4. **Monitoring and Evaluation:** Regularly assess the **effectiveness** of initiatives like **Operation Dronagiri** and refine strategies.

BSNL Launches India's First Direct-to-Device Satellite Connectivity

Syllabus Coverage

- **GS Paper III**: Science and Technology – Developments and their applications and effects in everyday life.
- **GS Paper II**: Government policies and interventions for development in various sectors.

Context

Bharat Sanchar Nigam Limited (BSNL) has introduced India's **first Direct-to-Device (D2D)** satellite connectivity, a significant step in democratizing satellite communication, previously restricted to **military and emergency uses**.

About Direct-to-Device Satellite Technology

1. **Principle of Operation**: Satellites function as **cell towers in space**, eliminating reliance on traditional **ground-based towers**.
2. **How It Works**:
   - Uses **Non-Terrestrial Network (NTN)** technology for two-way communication between satellites and devices.
   - **BSNL's Approach**: Employs Viasat's **Geostationary L-band satellites**, positioned **36,000 km** above Earth for uninterrupted signals.
3. **Global Comparisons**: Similar initiatives include **AST SpaceMobile**, **Lynk Global**, **SpaceX-Starlink**, and **Constellation Global**.

Significance of D2D Technology

1. **Reliable Connectivity**: Provides **uninterrupted internet** access, overcoming challenges like weather disruptions.
2. **Wider Coverage**: Ensures **high-speed internet** and connectivity in **remote and underserved areas**.
3. **Supports Digital Inclusion**: Empowers rural populations to make **UPI payments** and engage in digital transactions.
4. **Emergency Communication**: Enables **SOS messaging and emergency calls**, especially for adventurers, travelers, and disaster response.

Challenges in D2D Implementation

1. **Latency Issues**: Real-time applications like voice calls and video streaming may experience delays.
2. **Regulatory Complexities**: **Cross-border communication** poses legal and jurisdictional challenges.
3. **Spectrum Allocation**: Requires sufficient bandwidth for **seamless satellite-to-ground communication**.
4. **Device Compatibility**: Technology needs to be **compatible with diverse devices and operating systems**.
5. **Propagation Challenges**: Overcomes **signal loss and interference** in varying terrains and environments.

Way Ahead

1. **Technology Advancement**: Invest in **low-latency satellite systems** to improve real-time applications.
2. **Policy Framework**: Develop clear **regulatory guidelines** and agreements for cross-border satellite communication.
3. **R&D on Device Integration**: Promote partnerships for **universal compatibility** across devices.
4. **Spectrum Optimization**: Allocate and manage **satellite bandwidth** efficiently for uninterrupted services.
5. **Public Awareness Campaigns**: Educate consumers and businesses on leveraging **D2D satellite technology** for daily needs.