

WEEKLY UPDATES

DATE : 20th Oct- 27th Oct

POLITY & GOVERNANCE

India's New Statue of Lady Justice: A Symbol of Decoloniality and Judicial Transformation

Syllabus: Indian Polity and Governance, Judiciary, Cultural Heritage, Post-Colonial Identity

Context: A new statue of Lady Justice was recently inaugurated at the Supreme Court of India, replacing the older British-influenced version, marking a shift towards indigenous judicial symbolism.

Features of the New Lady Justice Statue:

1. **Traditional Indian Attire - Saree:** The statue wears a saree, symbolizing **Indian cultural heritage** and replacing the Western attire of the previous statue.
2. **Eyes Open- Open Eyes:** Unlike the traditional **blindfolded Lady Justice**, this statue's eyes are open, symbolizing that justice in India is **aware, inclusive, and vigilant**, addressing the **diverse social fabric and challenges** of Indian society.
3. **Scales of Justice- Impartiality:** The statue holds **scales in one hand**, representing the **weighing of evidence impartially** and ensuring **fairness** in judgments.
4. **Constitution in Hand- Emphasis on the Indian Constitution:** The statue holds a **copy of the Indian Constitution** in its other hand, replacing the sword. This highlights the **Constitution's supremacy** as the guiding document for justice in India, emphasizing **rule of law over retribution**.
5. **Decolonial Shift- Indigenization and Decolonization:** The replacement of colonial symbols, such as the **blindfold and sword**, reflects an effort to **decolonize judicial symbols** and align them with **Indian values and jurisprudence**.

Significance and Perspectives:

1. **Decolonial Representation in Judiciary :** This move represents a **break from colonial imagery**, aligning judicial symbols with **Indian cultural values** and the **supremacy of the Constitution**, instead of colonial symbols of retribution.
2. **Inclusivity in Justice:** The open eyes symbolize an **inclusive and vigilant judiciary** that recognizes **India's social diversity** and aims to deliver justice with **awareness of societal realities**.
3. **Emphasis on Constitutional Values:** By holding the **Constitution instead of a sword**, the statue emphasizes a judiciary that adheres to **constitutional values**, prioritizing **justice based on the rule of law** over punishment.

4. **National Identity and Judicial Independence:** The new statue reinforces **India's unique legal identity**, showcasing a judiciary that is **self-reliant and independent** in both form and function, while embracing symbols that resonate with Indian ethos.

eShram-One Stop Solution: Enhancing Welfare Access for India's Unorganized Workers"

Syllabus: Indian Polity and Governance, Social Welfare Schemes, Labour and Employment

Context: Union Minister Dr. Mansukh Mandaviya is set to launch the eShram-One Stop Solution, aimed at simplifying access to social security and welfare schemes for India's unorganized workforce.

About e-Shram:

1. Origin

- **Launch Date: August 26, 2021.**
- **Purpose:** Established to provide a **comprehensive database** of unorganized workers and facilitate **easy access** to welfare schemes.

2. Objectives

- Designed as a **One-Stop Solution** to **integrate information** on welfare schemes, making them accessible to unorganized workers.
- Streamlines processes for **identifying eligible beneficiaries** and ensuring maximum **coverage** of government schemes.

3. **Nodal Ministry: Ministry of Labour & Employment** is the overseeing body for the e-Shram initiative.

4. Key Features and Functionalities

- **Integration of Schemes:** Links **12 central government schemes** under one platform, ensuring comprehensive **benefit delivery** to unorganized workers.
- **Centralized Database:** Functions as a unified database, helping **identify eligible beneficiaries** and **improve access** to social security benefits.
- **Enrolment Success:** As of **October 2024**, more than **30 crore unorganized workers** are registered, demonstrating the platform's reach and accessibility.

5. Social Impact

- **Increased Awareness:** Empowers unorganized workers with **knowledge about welfare schemes** available to them, helping bridge gaps in **social security coverage**.
- **Enhanced Support for Vulnerable Groups:** Offers critical support to a workforce often excluded from formal welfare frameworks, improving **financial stability** and **well-being**.

Significance and Expected Outcomes:

1. **Streamlining Welfare Access:** By consolidating multiple schemes, the platform reduces **administrative barriers**, allowing unorganized workers to **easily access** various social welfare benefits.
2. **Greater Inclusivity in Welfare Schemes:** Encourages a **holistic welfare approach**, covering workers who lack job security and often miss out on **formal benefits**.

3. **Economic Empowerment:** Improves **financial resilience** among the unorganized sector by providing access to schemes like **healthcare, insurance, and pensions**, thus enhancing **economic security**.
4. **Better Data-Driven Decision Making:** With comprehensive worker data, policymakers can **design more targeted schemes** and implement **effective monitoring**.
5. **Support During Crises:** The centralized platform ensures **quick assistance** during crises like pandemics or economic downturns, giving unorganized workers **faster access to emergency support**.

Supreme Court Ruling on Industrial Alcohol

Context: A nine-judge Constitution Bench upheld the right of state legislatures to regulate industrial alcohol, classifying it under “intoxicating liquor” in the State List.

About the Constitutional Lists:

- **State List (Entry 8):** Grants states the authority to regulate “intoxicating liquor,” including production and sale. The Court expanded this to include industrial alcohol, considering its public health impact.
- **Union List (Entry 52):** Pertains to industries needing central control in the public interest, which the Centre argued includes industrial alcohol.

About Industrial Alcohol:

- Used primarily in industries, including pharmaceuticals, cosmetics, and fuels.
- **Denatured Alcohol:** Treated with toxic additives, making it unfit for consumption and exempt from high taxes.

Relevant Judgments:

- **ITC Ltd v. Agricultural Produce Market Committee (2002):** Affirmed state autonomy in regulating markets within constitutional balance.
- **Synthetics & Chemicals Ltd v. State of UP (1989):** Limited states to regulating only intoxicating liquors, leaving industrial alcohol to the Centre.
- **Ch Tika Ramji v. State of UP (1956):** Reinforced federal principles by allowing states to legislate in industries with existing central laws.

INTERNATIONAL RELATIONS

India's Maritime Security Efforts: Highlights from NASEEM AL BAHAR and Sagar Kavach Exercises

Syllabus: *International Relations, Security Forces and Agencies, Maritime Security, Indian Ocean Region*

Context: In October 2024, India undertook two major maritime exercises to bolster security and enhance cooperation in the Indian Ocean Region (IOR).

Details of Maritime Exercises:

1. NASEEM AL BAHAR Exercise

- **Nations Involved:** India and Oman.
- **Location:** Conducted off the coast of Goa, India.
- **Objective:** Strengthen bilateral maritime cooperation and improve interoperability between Indian and Omani naval forces.
- **Significance:** Builds on strategic ties, promoting mutual understanding and collaborative capabilities in the IOR, especially vital for anti-piracy and humanitarian assistance operations.

2. Sagar Kavach Exercise

- **Forces Involved:**
 - Indian Coast Guard, Indian Navy, Marine Police, State Police, Border Security Force (BSF), National Security Guard (NSG), and port authorities.
 - **Aerial Surveillance:** Supported by Coast Guard aircraft and drones to improve response time and coordination.
- **Location:** Conducted along the coastlines of Gujarat and the Union Territory of Daman & Diu.
- **Key Activities:**
 - **Coastal Security Drills:** Simulated scenarios tested Standard Operating Procedures (SOPs) and coordination among various forces.
 - **Preparedness for Maritime Threats:** The exercise focused on enhancing coastal defense mechanisms, training personnel, and validating response strategies to potential maritime threats.

Significance of These Exercises:

1. **Strengthening Regional Maritime Security:** Both exercises are vital for securing the Indian coastline and improving maritime domain awareness in the Indian Ocean, an area critical to global trade routes.

2. **Enhanced Interagency Coordination:** Sagar Kavach showcased effective **coordination across multiple forces**, crucial for **quick responses to maritime security threats** and strengthening SOPs in real-world scenarios.
3. **Improving Bilateral and Regional Ties :** NASEEM AL BAHR reinforces **Indo-Oman relations** and promotes **maritime collaboration**, essential for the **collective security** of the IOR.
4. **Countering Security Threats:** Through **simulated scenarios**, both exercises addressed potential threats such as **piracy, smuggling, and terrorism**, improving India's **maritime defensive posture**.
5. **Technological Integration and Surveillance:** The use of **drones and aircraft** in Sagar Kavach highlights India's commitment to leveraging technology for **surveillance and real-time situational awareness** along vulnerable coastal areas.

India-China Patrolling Agreement

Syllabus: *International Relations, India-China Relations, Border Security*

Context: India and China recently reached an agreement on patrolling arrangements along the Line of Actual Control (LAC) to address lingering border tensions. The agreement aims to restore patrolling rights, de-escalate military presence, and prevent further confrontations.

Key Points on the India-China Patrolling Agreement:

1. **Restoration of Patrolling Rights: Areas Covered:** Indian and Chinese troops will regain patrolling rights in contentious areas like the **Depsang Plains and Demchok**, aiming to restore the status quo prior to 2020.
2. **Three-Phase Process:** The agreement follows a **three-phase process** involving **Disengagement, De-escalation, and De-induction** of troops, gradually reducing military presence along the LAC.
3. **Resumption of Grazing Rights:** Traditional **grazing activities** will resume in specified regions, marking an effort to return to conditions that existed before the recent tensions.
4. **Monitoring and Verification: Joint Monitoring:** Both countries agree to close monitoring and verification mechanisms to prevent incidents similar to the **Galwan Valley clash** in 2020.
5. **Limited Areas of Engagement:** The **current disengagement** covers **Depsang and Demchok**, while areas like **Pangong Tso and Galwan Valley** remain unchanged.

Challenges in the De-escalation Process:

1. **Trust Deficit:** India remains cautious given China's **inconsistent adherence** to previous agreements, requiring a **"trust, but verify"** approach.
2. **Diverging Interpretations: Conflicting Statements:** China emphasizes general progress, while India focuses on specific steps toward de-escalation, reflecting different perspectives.
3. **Sequence of De-escalation:** India prioritizes **disengagement before de-escalation**, while China's stance on the sequence remains ambiguous, potentially complicating the withdrawal process.
4. **Political Sensitivities:** India links **border peace with overall bilateral relations**, whereas China treats the border issue separately from other diplomatic aspects, increasing diplomatic complexity.

Way Forward:

1. **Close Monitoring: Enhanced Surveillance:** Maintain stringent checks on patrolling to ensure compliance, discourage provocations, and detect potential violations.
2. **Strategic Engagement:** Continue **dialogues at diplomatic and military levels** to address boundary issues transparently, strengthening channels of communication.
3. **Strengthened Surveillance and Infrastructure: Build Infrastructure:** Strengthen LAC infrastructure and surveillance to promptly detect and respond to potential security concerns.
4. **Confidence-Building Measures:** Promote regular **communication channels and confidence-building measures** to rebuild trust and foster a cooperative security environment.

"Understanding the Shadow Fleet: Navigating Sanctions, Flags of Convenience, and India's Maritime Implications"

Syllabus: *International Relations, Economics, Maritime Security, Global Trade and Sanctions*

Context: The concept of a “shadow fleet” has gained prominence in the global maritime industry, especially as countries like Russia seek to bypass sanctions imposed due to conflicts, notably with Ukraine.

About the Shadow Fleet:

1. **Definition:** **Shadow Fleet** refers to a **group of tanker ships** that conceal the **ownership and origin** of their cargo. These tactics are employed to **bypass international sanctions and regulations**.
2. **Operational Tactics**
 - **Frequent Changes:** These ships regularly change **flags, names, and ownership** to obscure their activities.
 - **Complex Ownership:** Use of **shell companies** and **Flags of Convenience (FoC)** make it challenging for regulatory authorities to trace **actual ownership** and enforce sanctions.

3. **Purpose: Avoidance of Sanctions:** Shadow fleets allow **sanctioned countries** (e.g., Russia) to continue exporting goods, often essential commodities like **oil**.

4. **Impact on India: Involvement in Russian Oil Shipments:** India has been implicated in **shadow fleet activities** as some **Indian firms** are reportedly linked to shadow fleets in **Dubai** that carry Russian oil.

Flag of Convenience (FoC):

1. **Definition:** A **Flag of Convenience (FoC)** vessel is registered under the **flag of a country** different from the owner's base country, a common practice to **reduce operational costs** and avoid stringent regulations.

2. Purpose and Benefits

- **Cost Savings:** FoCs allow owners to benefit from **lower taxes** and **lax regulations** on crew welfare, ship maintenance, and safety.
- **Ease of Registration:** Countries offering FoCs, such as **Panama, Liberia, and the Marshall Islands**, have **less stringent maritime laws**.

3. Issues with FoCs

- **Obscured Ownership:** FoCs help owners conceal the **true origin** and ownership, complicating enforcement of **international regulations**.
- **Labor and Safety Concerns:** Ships under FoCs may lack compliance with **labor protections** and **safety standards**, raising humanitarian and safety concerns.

Indian Register of Shipping (IRS):

1. Background and Establishment

- **Founded:** Established in **1975** based on **Mudaliar Committee** recommendations, operating under the **Indian Companies Act**.
- **Mission:** Focuses on **accurate classification** and ensuring the safety of **mercantile shipping** and related maritime structures.

2. Key Functions

- **Setting Standards:** IRS establishes **construction, maintenance, and operational standards** for ships.
- **Surveys and Certifications:** Conducts **surveys** and provides **technical certifications** for maritime equipment and infrastructure.
- **Supporting Merchant Marine Industry:** Aids in developing **India's merchant marine industry** and evaluates **quality management systems** for the maritime sector.

3. Global Standing and Recognition

- **International Role:** IRS has gained international recognition and became the **Chair of the International Association of Classification Societies (IACS)** in 2019.

- **Commitment to Safety:** It promotes **maritime safety, environmental protection, and risk management** to maintain trust in global maritime operations.

Significance and Implications of Shadow Fleets and FoCs:

1. **Challenges in Sanction Enforcement:** Shadow fleets and FoCs make it difficult for **international bodies to trace and regulate** shipping activities, allowing sanctioned countries to **circumvent economic penalties**.
2. **Economic and Security Risks:** India's involvement with shadow fleets linked to **Russian oil** could lead to **diplomatic challenges** and affect **trade relations** with countries upholding sanctions.
3. **Environmental and Humanitarian Concerns:** Ships registered under FoCs may lack proper **safety and environmental standards**, increasing the risk of **maritime accidents and pollution**.
4. **IRS's Role in Maritime Integrity:** The IRS's **global recognition** supports India's commitment to **maritime standards and transparency**, although the shadow fleet issue suggests a need for **stricter oversight** in private sector engagements.

Way Forward:

1. **Stricter Regulations on Ownership Transparency:** International bodies could enhance regulations requiring **transparency in ship ownership** to mitigate the use of shadow fleets and prevent **sanction evasion**.
2. **Enhanced Monitoring of Flag of Convenience Vessels:** Closer monitoring of **FoC vessels** operating within Indian waters can prevent **safety risks and labor violations** associated with these ships.
3. **International Collaboration for Sanction Enforcement:** Strengthening **global partnerships** to track shadow fleet activities and enforce **sanctions collectively** can help uphold international law.
4. **Strengthening IRS's Oversight Capabilities:** Expanding IRS's capacity to **monitor Indian-linked vessels** internationally could bolster India's maritime integrity and **compliance with international standards**.

Extension of Kartarpur Corridor Agreement: Fostering Cross-Border Religious Harmony

Syllabus: *International Relations, India-Pakistan Relations, Religious and Cultural Diplomacy*

Context: India and Pakistan have agreed to extend the Kartarpur Corridor agreement by an additional five years, reinforcing this unique cross-border initiative that enables visa-free pilgrimage for Indian citizens.

About the Kartarpur Corridor:

- 1. Connecting Important Shrines:** The corridor links **Darbar Sahib Gurdwara in Kartarpur, Pakistan**—the final resting place of **Guru Nanak Dev**—to **Dera Baba Nanak shrine in India's Punjab**, allowing Sikh pilgrims to pay homage at one of their holiest sites.
- 2. Visa-Free Movement: Visa Exemption:** Indian pilgrims can visit the Kartarpur Gurdwara without a visa, requiring only a **permit**, which simplifies the pilgrimage process and fosters cross-border religious ties.
- 3. Inauguration and Significance: Commemorative Inauguration:** The Kartarpur Corridor was inaugurated on **November 12, 2019**, coinciding with the **550th birth anniversary of Guru Nanak Dev**, marking a historic occasion in Sikh religious history.
- 4. Year-Round Operation:** The corridor operates throughout the year, allowing up to **5,000 pilgrims** to visit daily under the terms of the agreement, providing regular access for Indian devotees.
- 5. Passenger Terminal at Dera Baba Nanak:** A **fully air-conditioned terminal** near **Dera Baba Nanak** facilitates the process, equipped with over **50 immigration counters** to efficiently handle pilgrim entry and exit, ensuring a smooth experience.

Significance of the Kartarpur Corridor Extension:

- 1. Strengthening Cross-Border Religious Diplomacy:** The extension of the agreement reinforces **people-to-people ties** between India and Pakistan, promoting **religious and cultural diplomacy** amidst political tensions.
- 2. Fostering Peace and Mutual Respect:** By enabling Sikh pilgrims to access a significant religious site, the corridor serves as a **symbol of peace** and mutual respect, bridging cultural divides between the two nations.
- 3. Enhancing Regional Tourism and Economy:** The increased flow of pilgrims has the potential to boost **local economies** near the corridor, enhancing tourism in Punjab on both sides of the border.
- 4. Facilitating Spiritual and Cultural Connection:** The Kartarpur Corridor allows Sikh devotees to experience a profound connection with their religious heritage, fostering **spiritual and cultural continuity** across borders.
- 5. Strengthening Indo-Pak Relations through Soft Diplomacy:** Initiatives like the Kartarpur Corridor leverage **soft diplomacy** to promote **positive engagements** between India and Pakistan, offering an avenue for cooperation in the face of geopolitical complexities.

I4C Study on Cyber Fraud in India

Context: The **Indian Cyber Crime Coordination Centre (I4C)** under the Union Home Ministry released a study projecting **significant economic losses** due to **cyber fraud** in the coming year.

Key Findings of the I4C Study:

- **Projected Losses:** India is expected to lose over **₹1.2 lakh crore** (0.7% of GDP) to cyber frauds in the next year.
- **Mule Bank Accounts:** Around **4,000 mule accounts** are identified daily, functioning as intermediaries for **money laundering**.
- **ATM Hotspots:** 18 ATM hotspots across India show high instances of fraudulent withdrawals, with **international withdrawals** traced to **ATMs in Dubai, Hong Kong, Bangkok, and Russia**.
- **Scam Origins:** Numerous scams are linked to **China** or Chinese-linked entities, with operations also traced to **Cambodia, Myanmar, Laos, and Azerbaijan**.
- **Cryptocurrency Usage:** Much of the stolen money is **converted into cryptocurrency** before being transferred out of India

Kazan Declaration at the 16th BRICS Summit

Context: The **16th BRICS Summit** held in Kazan, Russia, from **October 22 to October 24, 2024**, concluded with the adoption of the **Kazan Declaration** focusing on multilateralism, global development, and security.

16th BRICS Summit Highlights:

- **Theme:** “Strengthening Multilateralism for Just Global Development and Security.”
- **Participants:** BRICS leaders (Brazil, Russia, India, China, South Africa) and new partner nations, including **Egypt, Ethiopia, Iran, Saudi Arabia, and the UAE**.

Kazan Declaration – Key Outcomes:

Key Area	Highlights
Geopolitical Concerns	Advocated for a diplomatic solution to the Ukraine conflict and raised concerns over the humanitarian crisis in Palestine, condemning violence in Gaza, West Bank, and Lebanon.
Global Governance & Multilateralism	Called for global financial reforms and multilateralism, supporting a reformed G20 and a responsive global financial system.
Economic Cooperation	Emphasized the use of local currencies in cross-border trade and proposed a BRICS Grain Exchange and a Cross-Border Payment System .
Pandemic Preparedness & Health	Supported the BRICS R&D Vaccine Center and the development of Early Warning Systems for infectious diseases, including a focus on antimicrobial resistance.
Environmental Conservation	Endorsed India’s Big Cats Conservation Initiative and collaborative efforts to protect endangered species.

Expansion Partnerships

& Welcomed Egypt, Ethiopia, Iran, Saudi Arabia, and the UAE as new BRICS partners, enhancing the bloc's influence within the **Global South**.

Arugam Bay and Security Advisory

Context: Israel has advised its citizens to leave **Arugam Bay** in Sri Lanka due to a potential security threat, reflecting ongoing geopolitical concerns.

About Arugam Bay:

- **Location:** Situated on **Sri Lanka's southeast coast** within the **Batticaloa Territory**.
- **Historical Significance:** Part of the ancient **Mattakallappu Desam**, a region with historical and cultural value in Sri Lanka.
- **Tourism:** A favorite destination for Israeli tourists, featuring **businesses that cater to Hebrew speakers**, such as restaurants, spas, and a Chabad house.
- **Name Origin:** In Tamil, "Arugam Kudah" translates to the "**Bay of Cynodon dactylon**," named after a type of grass prevalent in the area.

DEFENCE & SECURITY

India's Strategic Edge: Launch of the Advanced S4* SSBN Submarine

Syllabus: *Defense Technology, Security Challenges and Strategic Planning, Indian Navy*

Context: India recently launched its fourth nuclear-powered ballistic missile submarine (SSBN), designated S4*, at the Ship Building Centre in Visakhapatnam. This submarine strengthens India's nuclear deterrence capabilities and marks significant progress in its SSBN programme.

About Nuclear-Powered Ballistic Missile Submarines (SSBNs):

1. Key Features

- **Nuclear Propulsion:** SSBNs are powered by **nuclear reactors**, allowing them to stay submerged for extended periods, limited only by food and maintenance requirements, which increases their operational stealth.
- **Ballistic Missile Capability:** Equipped with **submarine-launched ballistic missiles (SLBMs)**, SSBNs offer **second-strike capability** in nuclear deterrence strategies, enabling a country to retaliate even after a first-strike attack.
- **Stealth Design:** Designed to avoid detection, SSBNs maintain a **low-profile presence** underwater, reducing the likelihood of being tracked by enemy forces and enhancing their survivability.

India's SSBN Programme:

1. Operational SSBNs

- **INS Arihant:** India's first operational SSBN, commissioned in **2016**.
- **INS Arighaat:** India's second SSBN, commissioned in **2024**.

2. Upcoming SSBNs

- **S4 Submarine:** Named **Aridhman**, this submarine is currently undergoing **sea trials**.
- **S4*:** Recently launched, this SSBN is **larger and more advanced** than previous models, with an extended missile range capability.

Features of India's SSBN Fleet:

1. Missile Range

- **INS Arihant:** Equipped with **K-15 SLBMs** with a range of **750 km**.
- **S4*:** Will be fitted with the advanced **K-4 missile**, capable of reaching **3,500 km**, significantly expanding India's retaliatory strike capability.

2. Nuclear Deterrence

- **Second-Strike Capability:** SSBNs like the S4* provide India with **second-strike nuclear capability**, which is critical for maintaining a **credible nuclear deterrent**.
- **Strategic Value:** These submarines enhance India's ability to respond to a nuclear first-strike, ensuring **retaliation and deterrence** through survivability in remote oceanic regions.

3. Strategic Importance

- **Credible Deterrence:** SSBNs operate hidden in vast oceanic areas, providing a constant and undetected **nuclear threat** to adversaries.
- **National Security:** As a mobile platform with advanced SLBM capabilities, India's SSBN fleet strengthens **national security** and **regional strategic stability**.

Significance of the S4 Launch:* *Wisdom leads to success*

1. **Enhanced Deterrence Posture:** With **longer-range missiles** and **improved stealth**, S4* enables India to maintain a robust nuclear deterrent that can effectively reach multiple strategic targets.
2. **Self-Reliance in Defense Technology:** The indigenous development of SSBNs like S4* reflects India's **progress in defense technology** and strengthens its **self-reliance** in military assets critical for nuclear deterrence.
3. **Strategic Stability in South Asia:** By reinforcing its SSBN fleet, India contributes to **regional security** and **strategic stability**, balancing nuclear capabilities within the region amid increasing geopolitical tensions.
4. **Alignment with Nuclear Doctrine:** India's SSBNs align with its **"No First Use" (NFU) nuclear policy**, ensuring the capability to retaliate in case of a first-strike nuclear attack, thus maintaining **credibility and deterrence**.

Abhay Anti-Submarine Warfare Ship

Syllabus: *Internal Security, Defense Technology*

Context: India launched the seventh Anti-Submarine Warfare Shallow Water Craft (ASW SWC), Abhay, on October 25, 2024, at L&T's Kattupalli facility. **The Abhay class ships are designed to enhance India's anti-submarine warfare capabilities in shallow waters, replacing the previous Abhay class ASW Corvettes.**

About Abhay Anti-Submarine Warfare Ship:

- Purpose and Role:** The Abhay ASW ships are crafted for anti-submarine warfare (ASW) in coastal waters, capable of **Low Intensity Maritime Operations (LIMO)** and **mine-laying operations**, ensuring maritime security close to India's coastlines.
- Specifications**
 - **Dimensions:** Approximately **77 meters long**.
 - **Top Speed:** Capable of reaching speeds up to **25 knots**.
 - **Endurance:** Able to cover **1800 nautical miles**, suitable for sustained shallow-water operations.
- Indigenous Content and Manufacturing**
 - **Self-Reliance:** Over **80% of the components** are sourced from Indian manufacturers, contributing to the **Aatmanirbhar Bharat initiative** and enhancing India's self-sufficiency in defense production.
 - **Builder and Contract:** Built by **Garden Reach Shipbuilders & Engineers (GRSE)** under a **2019 contract with the Ministry of Defence**, emphasizing India's investment in indigenous shipbuilding capabilities.
- Significance**
 - **Strengthening Coastal Defense:** Designed specifically for **anti-submarine operations in shallow waters**, the Abhay class vessels bolster India's defenses in critical maritime zones.
 - **Employment and Economic Impact:** The project creates employment opportunities and advances local manufacturing, supporting India's defense ecosystem and industrial growth.
 - **Technological Advancement:** Reflects **India's growing capability in advanced shipbuilding** and contributes to the **Make in India** initiative by advancing local expertise in defense technology.

I4C Study on Cyber Fraud in India

Context: The **Indian Cyber Crime Coordination Centre (I4C)** under the Union Home Ministry released a study projecting **significant economic losses** due to **cyber fraud** in the coming year.

Key Findings of the I4C Study:

- **Projected Losses:** India is expected to lose over **₹1.2 lakh crore (0.7% of GDP)** to cyber frauds in the next year.

- **Mule Bank Accounts:** Around **4,000 mule accounts** are identified daily, functioning as intermediaries for **money laundering**.
- **ATM Hotspots:** 18 ATM hotspots across India show high instances of fraudulent withdrawals, with **international withdrawals** traced to **ATMs in Dubai, Hong Kong, Bangkok, and Russia**.
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- **Cryptocurrency Usage:** Much of the stolen money is **converted into cryptocurrency** before being transferred out of India.

ECONOMY

India's 13th Major Port: Galathea Bay's Role in International Container Transshipment

Syllabus: *Infrastructure Development, Indian Economy, Environment and Ecology, Strategic Maritime Trade*

Context: The International Container Transshipment Port (ICTP) at Galathea Bay in Great Nicobar Island has been designated as India's 13th major port, enhancing India's capacity in global maritime trade and logistics.

About Galathea Bay and the New Transshipment Port:

1. Location and Strategic Position

- **Location:** Situated on **Great Nicobar Island** within the **Andaman and Nicobar Islands** in the **Bay of Bengal**.
- **Proximity to Malacca Strait:** Strategically close to the **Malacca Strait**, a crucial maritime corridor that facilitates **35% of global sea trade**—vital for India's **Indo-Pacific logistics**.

2. International Container Transshipment Port (ICTP)

- **Purpose:** Designed as a transshipment hub for cargo from **India's eastern coast, Bangladesh, and Myanmar**.
- **Significance:** Aims to reduce dependency on foreign ports by enabling **direct transshipment** through an Indian port.

3. Development Phases

- **Phase 1 (Operational by 2028):** Initial handling capacity of **4 million TEUs** (Twenty-Foot Equivalent Units).
- **Full Development (By 2058):** Expected capacity to reach **16 million TEUs**.
- **Investment:** Total estimated cost of **₹41,000 crore**, with **₹18,000 crore** allocated for Phase 1.

4. Economic and Strategic Impact

- **Annual Savings:** Estimated to save **\$200-220 million** annually by reducing transshipment at **foreign ports**.

- **Maritime Autonomy:** Enhances India's **logistical autonomy** in the region, allowing it to serve as a primary maritime hub for **Indo-Pacific trade**.

5. Environmental Considerations

- **Ecologically Sensitive Zone:** Development requires **environmentally responsible planning** due to the **unique biodiversity** and **sensitive ecosystems** of Great Nicobar Island.

Significance and Strategic Importance:

1. **Boost to Regional Trade and Economy :**Reducing transshipment costs and time can help **increase export competitiveness**, boost **maritime revenue**, and stimulate local employment in the Andaman and Nicobar region.
2. **Enhancing India's Strategic Position :**The port's strategic location near **key Indo-Pacific routes** reinforces India's position as a **maritime power**, particularly in the context of **increasing Indo-Pacific trade activity**.
3. **Reduced Reliance on Foreign Ports :**By enabling direct cargo transshipment, the ICTP decreases India's reliance on ports in **Singapore** and **Colombo**, providing **economic and security benefits**.
4. **Environmental Responsibility:** Given the **biodiversity-rich environment** of Great Nicobar, this development serves as a **case study** in balancing infrastructure projects with ecological preservation.
5. **Job Creation and Local Development :**The port's phased development will drive **employment opportunities** and infrastructural upgrades on **Great Nicobar Island**, fostering economic growth in the region.

IMF's World Economic Outlook

Syllabus: *Indian Economy, International Relations, Economic Development, Global Economic Trends*

Context: The International Monetary Fund (IMF) **released its** World Economic Outlook (WEO) **during the** Annual Meetings in Washington, **providing critical insights on** global growth trends, inflation, **and major** economic risks.

Key Data from the World Economic Outlook (WEO):

1. India's Economic Growth

- **FY 2024-25:** Projected growth rate of **7%**.
- **FY 2025-26:** Expected to moderate to **6.5%**.
- **Decline from 2023:** India's growth rate, which was **8.2% in 2023**, is anticipated to normalize as **post-pandemic demand** stabilizes.

2. Global Economic Growth

- **Global Output:** Expected to grow at **3.2%** for both **2024 and 2025**.
- **Growth Deceleration:** Global growth projections reflect challenges from **geopolitical tensions** and **financial stability issues**.

3. Global Inflation Trends

- **Inflation Decline:** Global inflation is projected to drop from a peak of **9.4% in Q3 2022** to **3.5% by the end of 2025**.

- **Inflation Moderation:** This reflects the impact of **tight monetary policies** aimed at stabilizing prices.

Risks Identified by the IMF:

1. Geopolitical Tensions

- **Russia-Ukraine Conflict and West Asia:** Ongoing conflicts create **global economic uncertainty**, impacting trade, energy prices, and regional stability.

2. Increasing Protectionism and Tight Monetary Policies

- **Protectionist Policies:** The rise in protectionism disrupts **global supply chains** and may hinder **international trade and cooperation**.
- **Monetary Tightening:** Higher interest rates implemented to combat inflation could **curtail economic activity**, especially in emerging economies.

3. Sovereign Debt and Weak Economic Activity in China

- **Sovereign Debt Risks:** High levels of debt in several countries pose risks to **fiscal sustainability**.
- **China's Slowing Economy:** Weak economic growth in China, driven by a property market crisis and lower consumer spending, has a significant impact on **global trade**.

IMF's Recommendations – Triple Policy Pivot:

1. Monetary Policy Neutrality

- **Gradual Shift:** Countries should consider transitioning to a **neutral monetary policy stance**, balancing inflation control with economic growth support.

2. Building Fiscal Buffers

- **Reinforce Fiscal Health:** Countries are encouraged to rebuild **fiscal buffers** after several years of **expansive fiscal policies**, ensuring resilience against potential economic shocks.

3. Structural Reforms

- **Productivity and Demographics:** Emphasize reforms to boost **productivity** and manage demographic shifts.
- **Climate Transition:** Invest in **green technologies** and policies to support a **sustainable climate transition**.
- **Increasing Resilience:** Adapt policies to improve resilience against future **economic and geopolitical challenges**.

Significance of IMF's Recommendations:

1. **Support for Sustainable Economic Growth:** The IMF's recommendations support a balanced approach to **sustaining global economic stability** while addressing **structural vulnerabilities** in major economies.
2. **Inflation Management with Economic Growth:** **Monetary neutrality** and fiscal discipline are essential for addressing inflation without stifling growth, especially as global demand stabilizes post-pandemic.
3. **Strengthening Economic Resilience:** By building fiscal buffers and encouraging structural reforms, countries can better prepare for **geopolitical disruptions** and **climate-related challenges**.

4. **Role of India's Growth in Global Context:** With India projected to grow at **7% in 2024-25**, its growth is expected to play a stabilizing role in the **global economy**, contributing to regional economic resilience.

Indian Railways Revises Advance Booking System

Syllabus: Infrastructure, Economic Reforms, Public Services in India

Context: Indian Railways **has revised the** Advance Reservation Period (ARP), **reducing the booking window from 120 days to 60 days. This change aims to address issues like** high cancellation rates, fraud, **and** seat wastage.

About the Advance Booking System:

1. New ARP Rule

- Effective **November 1, 2024**, passengers can book train tickets up to **60 days in advance**, a change from the previous **120-day** advance booking period.

2. Historical Adjustments to ARP

- **1981-1985:** ARP was set at **90 days**.
- **1988-1993:** Reduced to **45 days**.
- **1995:** ARP set to **60 days**.
- **2008:** Extended to **120 days** to accommodate longer-term planning needs, now being revised back to 60 days.

3. Reasons for Shortening ARP

- **High Cancellation Rates:** Around **21%** of tickets booked in advance are canceled, leading to seat wastage.
- **Fraud Prevention:** Longer booking windows are exploited by **touts** and **impersonators** to reserve bulk tickets, creating inconvenience for genuine passengers.
- **Redundant Longer ARP:** **88-90% of reservations** occur within **60 days** of travel, making the longer booking window unnecessary.

4. Fraud and Abuse Prevention

- A **60-day booking window** curtails the ability of **touts** to block large volumes of seats, minimizes **impersonation**, and reduces **illegal ticket sales**.

5. Special Exemptions

- **Foreign Tourists:** Foreign nationals can still book tickets up to **365 days in advance** through a special quota to facilitate long-term travel planning.
- **Certain Trains:** Trains like the **Taj Express** are exempt from ARP rules since bookings are typically made only a few days before travel.

- **General Class Tickets:** Not impacted by ARP changes, as these tickets are generally purchased right before travel.

Significance of the ARP Revision:

1. **Enhanced Ticket Availability:** By shortening the ARP, **seat availability** is expected to improve, benefiting **last-minute travelers** and reducing cancellations.
2. **Reduction in Ticket Scalping:** A 60-day booking limit reduces the ability of touts to **hoard tickets** and resell them at inflated prices, improving accessibility for genuine passengers.
3. **Improved Efficiency;** A shorter ARP streamlines the **reservation system**, helping Indian Railways manage **seat allocations** more effectively and ensuring **efficient use of resources**.
4. **Financial Impact:** Lower cancellation rates will lead to **better revenue management** and reduce the administrative burden associated with **refunds and re-bookings**.
5. **International Accessibility:** The exemption for **foreign tourists** maintains India's attractiveness as a destination for international visitors planning long journeys, aligning with tourism promotion goals.

India's Economic Surge: A New Era of Growth and Global Influence

Syllabus: *Economics, Indian Economy, Inclusive Growth, Sustainable Development*

Context: At the Annual India Leadership Summit in New Delhi, discussions highlighted India's economic rise **and its** growing influence **compared to** China's historical dominance. **With** a projected 7% GDP growth rate **and over** 151,000 startups, **India's reforms and digital strides are fueling rapid economic growth.**

Key Data Points:

1. **GDP Growth: Projected Growth:** India's GDP is expected to grow at **7% in FY 2024-25**, keeping it the **fastest-growing major economy** globally (World Bank, 2023).
2. **Stock Market Performance: Five-Year CAGR:** Indian stock markets have delivered a **15% CAGR** over the past five years, outperforming **Chinese markets**, which showed near-zero or negative growth (Ananth Narayan, SEBI, 2024).
3. **Digital Expansion: UPI Transactions:** Digital payments through **UPI surged** from 92 crore transactions in FY 2017-18 to **13,116 crore in FY 2023-24**, showcasing **rapid digital adoption** (Digital India, 2024).
4. **Startup Ecosystem: Third-Largest Globally:** With **151,000 startups**, India ranks as the **third-largest startup ecosystem**, seeing a **15x investment growth** between 2015 and 2022 (Startup India, 2023).
5. **Financial Inclusion: PMJDY Impact:** Over **53 crore bank accounts** were opened under PMJDY, bringing millions into the **formal financial system** (Government of India, 2024).

Driving Factors of India's Economic Ascendancy:

- Digital Revolution: Digital India and UPI:** These initiatives have driven the transition to a **digital economy**, enhancing **financial inclusion** and making transactions **seamless** and accessible.
- Strong Stock Market Performance: Consistent Growth:** India's stock markets have been buoyed by **economic reforms** and **investment flows**, attracting both **domestic and foreign investors**.
- Startup Boom: Startup India:** This initiative has fostered **entrepreneurship and innovation**, helping diversify the economy and create jobs, contributing to **sustained economic growth**.
- AI and Technological Integration: AI for India 2.0:** Programs like these are positioning India as a leader in **artificial intelligence** and emerging technologies, creating a **future-ready workforce**.
- Inclusive Growth Policies: Financial Inclusion and Housing:** Schemes like **PMJDY** and **PMAY-U** have brought **millions into the formal economy** and provided affordable housing, fueling **broader economic development**.

India vs. China: Comparative Analysis

Aspect	India	China
GDP Growth (2024-25)	Projected at 7% (World Bank, 2023)	Projected at 4.8% (World Bank, 2023)
Stock Market CAGR	15% growth over the last 5 years (SEBI, 2024)	Near zero/negative growth (SEBI, 2024)
Digital Finance	13,116 crore UPI transactions (FY 2023-24)	Advanced but slower growth than India
Startup Ecosystem	151,000 startups ; 3rd largest globally (2023)	Slower growth due to regulatory restrictions
Demographics	Younger population, favorable dependency ratio (UN)	Aging population poses economic challenges (UN)

Limitations and Challenges for India:

- Infrastructure Gaps:** Despite growth, **infrastructure deficiencies** remain, especially in rural areas, affecting **productivity** and economic potential (World Bank, 2023).
- High Unemployment:** With a growing working-age population, India must address **unemployment and underemployment**, particularly in the **formal sector** (ILO, 2023).
- Income Inequality:** Economic growth has been uneven, with a significant portion of the population excluded from its benefits, leading to **wealth disparities** (Oxfam, 2023).
- Educational Deficiencies:** Challenges in the **quality and accessibility** of education, especially in rural and underprivileged areas, affect **human capital development** (UNICEF, 2024).
- Environmental Concerns:** Rapid urbanization and industrialization have led to **environmental degradation**, posing risks to sustainable long-term growth (UNEP, 2024).

Way Forward: Strategies for Sustained Growth

1. **Expanding Skilling Programs:** Enhance **upskilling initiatives** in AI and emerging technologies to better equip the workforce and address **employment challenges** (AI for India, 2024).
2. **Reducing Income Inequality:** Implement policies that **promote inclusive growth** to ensure equitable distribution of economic benefits, especially in underprivileged regions (Oxfam, 2023).
3. **Educational Reforms:** Focus on **improving educational quality and accessibility**, aligning curricula with **market demands**, particularly in tech-related fields (UNICEF, 2024).
4. **Climate-Resilient Policies:** Prioritize **sustainable industrialization and urban development** to mitigate environmental risks and promote long-term resilience (UNEP, 2024).
5. **Infrastructure Investment:** Develop **rural and urban infrastructure**, including transport and digital networks, to support broader economic growth and improve productivity.

Addressing Population Decline in Southern India

Syllabus: *Demography and Population, Economic and Social Development, Internal Migration, Political Representation*

Context: The Chief Minister of Andhra Pradesh recently announced incentives for families to have more children, highlighting concerns over a declining young population in Southern India and the resulting socioeconomic challenges.

Current Demographic Trends in Southern India:

1. **Lower Fertility Rates; Southern States:** Andhra Pradesh, Tamil Nadu, and Kerala have either reached or are close to **replacement-level fertility** (2.1 children per woman). Kerala achieved this milestone in **1988** and Andhra Pradesh in **2004**.

2. Aging Population

- **Kerala:** Projected increase in the **60+ age group** from **13% in 2011** to **23% by 2036**.
- **Andhra Pradesh:** Experiencing a similar demographic shift, with low fertility rates and **higher life expectancy** contributing to an aging population.

3. **Slow Population Growth: Contribution to India's Population Growth:** Southern states are expected to contribute only **9%** to India's total population growth from **2011 to 2036**, while states like **Uttar Pradesh** and **Bihar** will have a significantly larger share.

4. **Reliance on Migration: Workforce Balance:** Southern states are increasingly dependent on **migration from Northern India** to balance the workforce as the working-age population declines.

Challenges Posed by Population Decline in Southern India:

1. **Aging Workforce: Labor Shortage:** A shrinking young population reduces the **working-age demographic**, leading to potential **labor shortages** and higher **dependency ratios** (Ministry of Labor Statistics).

2. **Economic Strain: Healthcare and Social Security:** Rising elderly populations, particularly in Kerala, are expected to increase **healthcare demands** and **social security expenses**, creating budgetary pressures for the state.
3. **Political Representation: Parliamentary Seats:** Slower population growth could lead to **reduced representation** in Parliament after **constituency delimitation**, potentially disadvantaging Southern states relative to **more populous Northern states** like Uttar Pradesh and Bihar.
4. **Labor Market Imbalance: Workforce Shortfall:** Declining numbers of young workers may lead to **labor shortages** in certain sectors, increasing reliance on **internal migration** or even outsourcing to fill workforce gaps.
5. **Healthcare Burden: Elderly Care:** A larger elderly population will place **higher demands on healthcare infrastructure** and increase the need for **specialized medical services** (WHO Report on India).

National Impact of Southern Population Decline:

1. **North-South Divide: Shifting Focus:** Higher population growth in Northern states like Uttar Pradesh could shift **political and economic attention northward**, influencing **resource allocation** and policy decisions.
2. **Internal Migration Dynamics: Labor Mobility:** Migration from Northern to Southern states could address **labor shortages** but might also lead to **social and cultural tensions** (2023 Government Migration Report).
3. **Electoral Representation: Increased Representation for Northern States:** States such as Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh may gain more **political representation**, influencing **policy priorities** on a national scale.
4. **Economic Shifts: Regional Economic Balance:** Slower population growth in the South and higher growth in the North could impact **India's economic balance**, affecting **investment flows** and **development priorities** (National Population Commission Report).
5. **Education and Workforce Implications: Decline in Youth Population:** A dwindling young population may reduce **entrants into the labor market** in Southern states, impacting industries reliant on younger workers (NITI Aayog Report).

Policy Suggestions and Way Forward:

1. **Encouraging Migration: Attracting Northern Workers:** Southern states can alleviate workforce shortages by attracting migrants from Northern India, benefiting from their **younger working-age population**.
2. **Political Representation Reforms: Addressing Demographic Differences:** Reforms in **political representation** can ensure states with lower population growth are not **disadvantaged in Parliament**, supporting balanced national governance.
3. **Workforce and Technological Planning: Investment in Automation:** Emphasizing **automation, technology, and retraining** programs to offset the effects of a shrinking workforce and boost productivity (Economic Survey).
4. **Incentivizing Families: Comprehensive Support Programs:** Rather than direct birth incentives, implementing **family support programs** focused on healthcare, education, and job opportunities may be more effective in promoting family growth.

5. **Balanced Regional Development: Reducing Disparities:** Focusing on equitable economic and social development across regions can better manage migration flows and reduce North-South disparities (NITI Aayog).

Case Study: Comparing Uttar Pradesh and Southern States

- **Fertility and Aging:** Kerala reached replacement fertility decades ago, with an expected elderly population of **23% by 2036**, compared to **Uttar Pradesh's 12%**.
- **Population Growth:** Uttar Pradesh will contribute **19%** to India's population increase by 2036, while Southern states will add only **9%**.
- **Dependency Ratios:** Uttar Pradesh will maintain a more **favorable dependency ratio** due to its younger demographic, while Kerala will face rising costs in **healthcare and social security**.

Z-Morh Tunnel: Strengthening Connectivity and Strategic Access in Jammu and Kashmir

Syllabus: *Infrastructure, Strategic Projects, Security Challenges in Border Areas, Defense and Internal Security*

Context: Recently, seven workers of APCO Infratech, the company constructing the Z-Morh Tunnel, were tragically killed in a militant attack in Jammu and Kashmir. This incident highlights both the strategic importance of the project and the challenges in its completion.

About the Z-Morh Tunnel:

1. **Location:** **6.4 km tunnel near Gagangir village in Ganderbal district**, the tunnel connects **Sonamarg to Kangan** in central Kashmir.
2. **Strategic Importance:** Part of the **Zojila tunnel project**, the Z-Morh Tunnel offers **all-weather connectivity** between **Srinagar and Ladakh**. This link is critical for **military access** to key border regions, enhancing **logistical capabilities** and **year-round access** to remote areas.
3. **Altitude and Terrain:** Located at an altitude of **over 8,500 feet**, the tunnel bypasses **snow-prone zones**, ensuring **uninterrupted travel** despite harsh winter conditions that frequently block traditional routes.
4. **Construction History and Current Management**
 - **Initial Development:** Originally conceptualized by the **Border Roads Organisation (BRO)** in **2012**.
 - **Project Transfer:** Later transferred to the **National Highways and Infrastructure Development Corporation Limited (NHIDCL)**.
 - **Execution:** APCO Infratech currently undertakes construction, with the tunnel **soft-opened in February 2024**. Full completion is delayed due to the **Model Code of Conduct (MCC)** in place for J&K elections.

5. Military Significance

- The Z-Morh Tunnel ensures vital access for **Indian defence forces** to sensitive regions like the **Siachen Glacier** and **Eastern Ladakh**. This connectivity is especially important given ongoing **border tensions with China and Pakistan**.

Significance and Implications of the Z-Morh Tunnel Project:

1. **Strategic Military Access** The tunnel provides **secure and reliable connectivity** to border areas, allowing for **efficient troop and supply movement**. This access strengthens India's **defense posture** in regions where rapid deployment is essential.
2. **Economic Development and Tourism Boost** By connecting Kashmir to Ladakh, the tunnel fosters **economic development** and promotes **tourism** in areas that were previously isolated during winter months.
3. **Reduced Dependence on Weather Conditions** **All-weather connectivity** ensures that even during heavy snowfalls, **civilian and military movement** remains unaffected, thereby securing **supply chains** and local economies in high-altitude regions.
4. **Safety and Security Challenges** The recent **militant attack** highlights the risks for workers on infrastructure projects in Kashmir, underscoring the **need for enhanced security measures** during construction.
5. **Symbol of Technological Achievement** Situated at a challenging altitude and rugged terrain, the Z-Morh Tunnel showcases **engineering and logistical expertise**, marking a milestone in India's **infrastructure capabilities** in mountainous regions.

Coking Coal Imports in India

Context: India's **coking coal imports** hit a six-year high in the first half of **FY24 (April-September 2023)**, with significant imports from **Russia** as domestic steel production rose.

Current Status of Coking Coal Imports:

- **Import Volume:** India imported **29.6 million tonnes (mt)** of coking coal in H1 FY24.
- **Russian Imports:** Shipments from Russia saw a **200% increase**, reaching 4 MT, capitalizing on discounted prices.
- **Alternative Sources:** Imports from **Australia** declined as mills turned to Russia for cost-effective sourcing.

About Coking Coal:

- **Composition:** High in **carbon content** with low levels of **sulphur, phosphorus, and alkalis**, making it ideal for **steelmaking**.
- **Formation:** Produced through the carbonization of coal at high temperatures to create **metallurgical coke**.
- **Importance in Steel Production:** Essential for **producing pig iron** in blast furnaces and acts as a reducing agent.
- **Industrial By-products:** Produces by-products like **tar, benzole, ammonia sulphate, and coke oven gas**, beneficial for chemical industries and power generation.

India's Coking Coal Dependency: Despite being a leading steel producer, India is heavily reliant on **coking coal imports** due to limited domestic reserves.

GEOGRAPHY

Azores Archipelago: A Model of Marine Conservation in the North Atlantic

Syllabus: *Geography, Environment and Ecology, Biodiversity and Conservation*

Context: The Azores Regional Assembly has recently sanctioned the establishment of the largest marine protected area in the North Atlantic, contributing significantly to international conservation efforts and the UN's 2030 conservation targets.

About the Azores Archipelago:

1. Location and Formation

- **Location:** Situated approximately **1,500 km west** of mainland Portugal in the **North Atlantic Ocean**.
- **Formation:** Originated from volcanic activity, the archipelago lies above the **Azores Triple Junction**, the meeting point of the **Eurasian, North American, and African tectonic plates**.

2. **Geography:** The **nine volcanic islands** are divided into three groups: **northwest, central, and eastern** islands, arranged along a northwest-southeast axis.

3. **Key Features:** **Mount Pico on Pico Island** stands as the **highest peak** in the Azores, offering scenic volcanic landscapes.

4. **Climate:** The Azores experience an **oceanic subtropical climate**, with **mild, stable temperatures year-round** due to the ocean's influence.

5. Unique Flora and Fauna

- **Endemic Species:** Home to rare species such as the **Azores bullfinch** and **Monteiro's storm petrel**.
- **Laurel Forests:** Dense laurel forests are an important part of the island's terrestrial ecosystems, supporting diverse life forms.

Marine Conservation Efforts:

1. **Largest Protected Marine Area:** Recently, the Azores established a **300,000 square km** marine protected area to safeguard **underwater mountain ranges** and delicate **deep-sea ecosystems**.
2. **Conservation Leadership:** The Azores' conservation efforts align with the **UN's 2030 goal** of preserving **30% of land and sea areas**, marking a significant step toward global conservation goals.
3. **Marine Biodiversity:** Known for a wide range of **marine biodiversity**, the region hosts diverse marine habitats including:
 - **Deep-sea coral reefs**
 - **Hydrothermal vents**
 - Rich populations of marine species that are essential to North Atlantic biodiversity.

Significance and Way Forward:

1. **Global Marine Conservation Model:** The Azores' proactive conservation measures position it as a model for **marine protection**, showcasing effective strategies for preserving marine and terrestrial biodiversity.
2. **Protecting Sensitive Ecosystems:** The establishment of large marine reserves helps in **shielding delicate ecosystems** from human interference, crucial for **preserving fish stocks, marine flora, and deep-sea habitats**.
3. **Contribution to International Goals:** The Azores' commitment supports **international biodiversity targets**, contributing to efforts to combat climate change and protect marine life.
4. **Tourism and Education:** Conservation can enhance **eco-tourism**, drawing visitors to explore the Azores' rich natural beauty and promoting environmental awareness among locals and visitors alike.

Cyclone Dana: Forecast, Impact, and Understanding Cyclone Naming Conventions

Syllabus: *Geography, Natural Disasters, Disaster Management*

Context: The India Meteorological Department (IMD) has predicted that Cyclone Dana will intensify into a severe cyclonic storm by **October 23, 2024**. The cyclone is expected to impact Odisha and West Bengal, with anticipated wind speeds reaching up to 120 km/h.

Cyclones and Their Features:

1. **Definition** A **cyclone** is a large-scale **air mass** that rotates around a central **low-pressure area** in the atmosphere, creating high-energy systems.
2. **Formation Conditions**
 - **Warm Ocean Waters:** Cyclones form over **warm ocean waters** with surface temperatures above **26.5°C**.

- **Upward Movement of Warm Air:** Rapid upward movement of warm air, which then cools and condenses to form clouds, releases **latent heat** that powers the cyclone.

3. *Wind Speed Classification* **Severe Cyclonic Storms:** Typically reach wind speeds between **89 and 117 km/h**; in the case of Cyclone Dana, wind speeds are projected to hit **120 km/h**, which may lead to **high impact**.

4. Impacts of Cyclones

- **Heavy Rainfall:** Torrential rain often results in **flooding**.
- **High-Speed Winds:** These winds can cause significant **infrastructure damage** and **uproot trees**.
- **Storm Surges:** Cyclones bring in high waves and storm surges, which flood coastal areas and displace communities.

About the Naming of Cyclones:

1. Origin and Purpose

- The system for naming cyclones in the **Indian Ocean region** began in **2000** under **WMO/ESCAP** (World Meteorological Organization and the Economic and Social Commission for Asia and the Pacific).
- **Purpose:** Simplifies communication and tracking of storms, making it easier for the **public, media, and authorities** to prepare and respond.

2. Member Countries

- The original members were **Bangladesh, India, the Maldives, Myanmar, Oman, Pakistan, Sri Lanka, and Thailand**.
- In **2018**, **Iran, Qatar, Saudi Arabia, UAE, and Yemen** were added to the naming panel.

3. Guidelines for Naming

- **Short and Pronounceable:** Names should be easy to pronounce and recognizable.
- **Neutrality:** Names must avoid references to **politics, religion, or culture** and should not be offensive.
- **No Repetition:** Each name is used only once to avoid confusion.

4. Naming Process

- **Sequential List:** Each country suggests **13 names** that are used sequentially when a new cyclone forms. For instance:
 - **Remal** (suggested by Oman)
 - **Asna** (suggested by Pakistan)
 - **Dana** (suggested by Qatar) – which is currently the name in use for the latest cyclone.

Significance of Cyclone Dana and Expected Impact in India:

1. **Enhanced Preparedness:** The naming and timely forecasting allow **better coordination** among disaster management agencies and facilitate **public awareness**.
2. **Potential Threats to Coastal States:** **Odisha and West Bengal** are expected to experience **heavy rainfall and strong winds**. This may result in **infrastructural damage, crop loss, and coastal flooding** in vulnerable areas.
3. **Improving Communication with Naming Conventions:** By assigning a recognizable name, **cyclone tracking** becomes easier for the public, helping coastal residents take necessary **precautionary measures**.
4. **Importance of Early Warning Systems:** The IMD's forecast emphasizes the need for **robust early warning systems** and preparedness for severe storms, particularly in cyclone-prone regions.

Bioluminescent Waves Light Up Chennai's Coast

Syllabus: *Geography, Environment, Marine Ecosystems, Natural Phenomena*

Context: Following heavy rains in Chennai, a **stunning natural display** of bioluminescent waves **appeared along the East Coast Road (ECR) beach**. This rare occurrence **captivated residents, turning the coastline into a glowing spectacle**.

About Bioluminescence:

1. **Definition:** *Bioluminescence is the natural production of light by living organisms through chemical reactions. It commonly occurs in marine environments, creating spectacular visual displays.*
2. **Organism Responsible:** *Noctiluca scintillans: Also called "sea sparkle", Noctiluca scintillans is a bioluminescent phytoplankton that emits a blue glow when disturbed by movement, such as waves or human activity.*
3. **Other Bioluminescent Marine Species:** *Apart from phytoplankton, certain fish, bacteria, and jellyfish also produce bioluminescent light. Each species has its unique method and purpose for producing light.*

Purpose of Bioluminescence in Marine Life:

1. **Defense Mechanism:** Some organisms use bioluminescence to **confuse or startle predators**, giving them time to escape.
2. **Communication:** Bioluminescence aids in **intra-species communication**, helping marine creatures identify each other in the dark ocean depths.
3. **Attraction:** Bioluminescent light can be used to **attract prey** or mates, drawing organisms closer with the glow.

Environmental Conditions for Bioluminescence:

1. **Location-Specific Occurrence**

- Bioluminescence can occur in various **marine environments**, from coastal waters to the deep sea, depending on the organisms present and the conditions.

2. Trigger Factors

- Natural factors like **water movement, weather conditions, and nutrient availability** influence the visibility of bioluminescent organisms. The recent **heavy rains in Chennai** may have contributed to nutrient levels and water mixing, creating favorable conditions for **Noctiluca scintillans** to thrive.

Significance and Impact of Bioluminescent Displays:

1. **Ecological Insight:** Observing bioluminescence provides insight into the **health and diversity of marine ecosystems**. The presence of **Noctiluca scintillans** and other phytoplankton often indicates **rich nutrient availability**.
2. **Tourism and Public Interest:** Bioluminescent events attract considerable **public interest and tourism**, creating awareness about marine biodiversity and the importance of **protecting coastal habitats**.
3. **Marine Ecosystem Dynamics:** Bioluminescent organisms play crucial roles in **marine food chains** and may influence predator-prey interactions within the ecosystem.

AGRICULTURE

Di-Ammonium Phosphate (DAP) Shortage

Syllabus: Agriculture, Indian Economy, Food Security

Context: Di-Ammonium Phosphate (DAP), a crucial fertilizer for Indian agriculture, is experiencing a shortage ahead of the rabi sowing season, impacting crop production prospects and raising concerns about food security.

Key Data Points on DAP Shortage:

1. **Sales Decline: April-September 2024:** DAP sales in India dropped to **45.72 lakh tonnes**, a **27.2% decline** from **62.83 lakh tonnes** in 2023, signaling reduced availability for farmers during crucial sowing periods.
2. **Imports and Production Challenges:**
 - **Imports:** Declined to **19.67 lakh tonnes** in 2024, down from **34.53 lakh tonnes** in 2023.
 - **Domestic Production:** Reduced slightly to **21.53 lakh tonnes** from **23.29 lakh tonnes** the previous year, creating a supply crunch.
3. **Price Increase: Cost for Farmers:** DAP prices have increased to **₹1,600-1,650 per bag**, above the government-fixed MRP of **₹1,350**, due to **global price rises and shortages**.
4. **Fertilizer Sales Trends: DAP Decline:** While DAP sales fell, **urea and complex fertilizers** saw increases, with urea sales rising to **189.11 lakh tonnes** from **183.95 lakh tonnes** during the same period.

5. **Subsidy and Import Costs: Subsidy Disparity:** Despite a government subsidy of ₹21,911 per tonne, the actual import cost of DAP has reached ₹65,000 per tonne, making imports unviable for private players and worsening the shortage.

About Di-Ammonium Phosphate (DAP):

1. Role in Indian Agriculture:

- **Key Fertilizer:** DAP is the second-most used fertilizer after **urea** and is essential for its balanced composition of **Nitrogen (18%)** and **Phosphorus (46%)**.
- **Importance at Sowing Stage:** Nitrogen and phosphorus are critical for **early root development and plant health**, making DAP particularly important during sowing.

2. Nutrient Benefits:

- **Nitrogen:** Supports foliage growth and overall plant development.
- **Phosphorus:** Essential for **root development** and **energy transfer** within plants, supporting robust crop establishment.

3. Manufacturing Process:

- **Production:** DAP is produced by reacting **ammonia with phosphoric acid** in controlled conditions, and it is manufactured in several fertilizer plants across India.

Implications of DAP Shortage on Indian Agriculture:

1. **Impact on Crop Yields:** The shortage and high prices of DAP could limit access for farmers, potentially leading to **suboptimal nutrient application** and reduced crop yields for rabi crops like **wheat, pulses, and mustard**.
2. **Rising Input Costs for Farmers:** Farmers paying above the **government-fixed MRP** for DAP increases their input costs, reducing **profit margins** and straining financial resources, especially for small and marginal farmers.
3. **Dependency on Urea and Alternative Fertilizers:** With DAP in short supply, farmers may **increase urea usage**, which can **disrupt soil nutrient balance** and harm long-term soil health.
4. **Food Security Concerns:** Reduced availability of DAP at a critical stage may impact the **rabi harvest**, raising concerns about **food security** and stability of agricultural output in India.
5. **Financial Strain on Government Subsidy System:** With rising global prices and high import costs, the **government's fertilizer subsidy bill** could increase, putting pressure on fiscal resources.

Way Forward for Addressing the DAP Shortage:

1. **Increase Domestic Production Capacity:** **Boost indigenous production** of DAP to reduce import dependency and stabilize supply during peak agricultural seasons.
2. **Alternative Nutrient Sources:** Encourage the use of **alternative phosphatic fertilizers** and balanced nutrient solutions that can partially replace DAP's role in crop nutrition.
3. **Strengthen Supply Chain and Distribution:** Streamline the **fertilizer distribution system** to ensure timely availability of DAP and other key nutrients to farmers in need.
4. **Price Stabilization Measures:** The government could consider **subsidizing private players' import costs** or negotiating bulk import agreements to reduce market prices for DAP.
5. **Enhance Soil Health Management:** Promote **integrated nutrient management** practices to maintain soil health and reduce over-reliance on chemical fertilizers like DAP and urea.

Rural India's Growing Agricultural Dependence: Insights from the All India Rural Financial Inclusion Survey (2021-22)

Syllabus: Agriculture and Allied Activities, Rural Development, Indian Economy, Employment Trends

Context: The All India Rural Financial Inclusion Survey (2021-22) highlights a significant shift, with more rural households relying on agriculture, reversing earlier trends of declining agricultural dependence.

Key Findings of the Survey:

1. Increase in Agricultural Households

- **57%** of rural households identified as "**agricultural**" in 2021-22, a rise from **48%** in 2016-17.
- This includes **semi-urban centers** with populations below 50,000.
(Source: NABARD's All India Rural Financial Inclusion Survey)

2. Growth in Agricultural Income

- Average monthly income for agricultural households increased to **₹13,661** in 2021-22, compared to **₹8,931** in 2016-17.
- Agricultural households earned **more than non-agricultural households**, indicating a boost in the sector's contribution to rural incomes.

3. **Rising Income from Farming Activities and Animal Husbandry** rose to over **45%** from **43.1%** in 2016-17.

4. **Impact of COVID-19 on Employment Trends** The economic slowdown due to **COVID-19** led many to return to agriculture, which faced fewer disruptions due to exemptions during lockdowns.

5. **Increased Agricultural Employment** According to PLFS data, agriculture engaged **46.5% of India's workforce in 2020-21**, up from **42.5%** in 2018-19.

Positive Outcomes:

- **Higher Agricultural Participation:** More households now rely on agriculture, which may revitalize the rural economy.
 - Example: **57% of rural households** engaged in agriculture (NABARD).
- **Improved Agricultural Income:** Increased monthly income for agricultural households strengthens rural economic stability.
 - Example: **Income increased to ₹13,661** from **₹8,931** (NABARD).
- **Resilience During Pandemic:** Agriculture proved resilient during COVID-19, providing livelihoods when non-farm employment was limited.
 - Example: Agriculture was **exempt from lockdowns** (NABARD, PLFS).
- **Enhanced Farm Productivity:** Rising income from farming and animal husbandry reflects productivity gains.
 - Example: **Income from cultivation and animal husbandry** rose to **45%** (NABARD).

Challenges Noted:

- **Shortage of Non-Farm Jobs:** Reliance on agriculture reflects limited alternative employment in manufacturing and services.
 - *Example:* Only **11.4%** of the workforce is in **manufacturing** (PLFS).
- **Low Marginal Productivity:** Agricultural employment often yields low productivity and subsistence-level wages.
 - *Example:* Employment characteristics in agriculture are similar to **low-wage informal sectors**.
- **Reduced Income Diversification:** Agricultural households are earning less from non-farm sources, increasing their vulnerability to agricultural risks.
 - *Example:* Income from non-farm sources decreased across **land-size categories** (NABARD).
- **Regional Economic Disparities:** States like Bihar, UP, and Chhattisgarh exhibit higher dependency on agriculture, indicating uneven economic development.
 - *Example:* In **Bihar, Madhya Pradesh, and Chhattisgarh**, over **50%** of the labor force is in agriculture (PLFS).

Way Forward:

1. **Promote Employment Diversification:** Develop rural industries and service sectors to create non-agricultural jobs.
2. **Enhance Agricultural Productivity:** Invest in modern technologies and practices to improve yields and income.
3. **Strengthen Rural Infrastructure:** Improve transportation, irrigation, and storage to support agriculture and other rural enterprises.
4. **Implement Skill Development Programs:** Facilitate skill-building initiatives in rural areas to equip youth for non-farm employment opportunities.

21st Livestock Census Operation

Context: The **21st Livestock Census Operation** was officially launched on **October 25, 2024** by the **Ministry of Fisheries, Animal Husbandry, and Dairying** to gather comprehensive data on India's livestock sector.

About the 21st Livestock Census:

- **Ministry Involved:** Led by the Ministry of Fisheries, Animal Husbandry, and Dairying.
- **Frequency:** Conducted every **five years** since 1919, with the last census held in **2019**.
- **Census Period:** Scheduled from **October 2024 to February 2025**.
- **Scope:**
 - Covers **15 livestock species** including cattle, buffalo, yak, sheep, goats, and more.
 - Includes **poultry species** like fowl, ducks, turkeys, and quail.
 - Provides data on **219 indigenous breeds** of 16 species.
- **New Features:**
 - First census to capture **data on livestock holdings** by pastoralists.

- Information on the **gender** of individuals involved in livestock rearing.
- **Technology:** Utilizes **mobile technology** for efficient data collection and transmission.
- **Field Officials:** Approximately **1 lakh veterinarians and para-veterinarians** will conduct a door-to-door survey.

Importance: The census provides critical data for **policy-making**, helping to support and drive growth in the **livestock sector**.

SOCIAL ISSUE

Achieving Foundational Literacy and Numeracy (FLN) in Indian Schools: Challenges and the Way Forward

Syllabus: *Education, Social Issues, Inclusive Development*

Context: Indian schools face significant challenges in achieving Foundational Literacy and Numeracy (FLN) goals, especially for students from socioeconomically disadvantaged backgrounds. Despite progress, with non-achievement of FLN goals reduced from 40% to 20% by grade 3, there remain persistent gaps in learning outcomes.

Key Data Points on FLN in India:

1. **FLN Achievement Gap:** 20% of students do not achieve foundational literacy and numeracy by grade 3; previously, this rate was 40%.
2. **Socioeconomic Disadvantage:** Over 80% of students come from socioeconomically disadvantaged backgrounds, impacting their ability to achieve FLN due to factors like poverty, malnutrition, and absenteeism.

Challenges to Achieving FLN in India:

1. Impact of Poverty

- **Learning Outcomes:** Poverty often results in **malnutrition, limited healthcare**, and higher absenteeism, directly affecting **student learning**.
- **Example:** Many students in rural areas contribute to **family livelihood activities**, reducing school attendance and academic focus.

2. Resource Constraints in Schools

- **Lack of Trained Teachers and Materials:** Schools often lack adequate **resources, infrastructure, and trained teachers** necessary to support individualized attention and remedial education.
- **Example:** Many government schools, especially in rural regions, suffer from **teacher shortages** and **insufficient learning materials**.

3. Learning Gaps due to Absenteeism

- **Irregular Attendance:** Children from disadvantaged backgrounds frequently miss school due to **illness, family duties**, or seasonal migration, leading to **learning gaps**.
- **Example:** Seasonal migration in states like Maharashtra and Madhya Pradesh causes **disruption in attendance** for many children.

4. Mental Health and Social Exclusion

- **Social Discrimination:** Marginalized children often experience **stress and exclusion** in school, affecting concentration and performance.
- **Example:** Students from **Dalit communities** may face discrimination, impacting their **psychological well-being and learning environment**.

5. Curriculum and Pedagogy Limitations

- **One-Size-Fits-All Curriculum:** The standardized curriculum often fails to meet the diverse learning needs of students, especially those who require **personalized and remedial support**.
- **Example:** Lack of flexibility in the curriculum makes it difficult for students with **learning disabilities** or those needing **extra assistance** to keep up.

Way Forward:

1. Customized Learning Solutions

- Implement **personalized learning plans** and **remedial programs** for students from disadvantaged backgrounds.
- **Example:** Emphasize **skill-based learning** and close learning gaps early through targeted interventions.

2. Enhanced Teacher Training

- Equip teachers with training on managing **diverse classroom environments** and addressing unique challenges faced by disadvantaged students.
- **Example:** Include modules on **inclusive teaching practices** and culturally responsive pedagogy in teacher training programs.

3. Community Involvement

- **Engage parents and communities** to ensure children continue learning outside school hours and receive support at home.
- **Example:** Conduct **parent-teacher workshops** to raise awareness about continuous learning and its benefits.

4. Increased Government Support and Resources

- **Boost funding** for public schools to improve infrastructure, provide **teaching materials**, and maintain optimal **teacher-student ratios**.
- **Example:** Policies should also focus on providing **nutritional and healthcare support** for children, improving their overall well-being.

5. Focus on Mental Health

- Introduce **psychological support programs** to help children dealing with stress and social exclusion.

- **Example:** Establish counseling services and mental health programs in schools, particularly in high-poverty areas.

ENVIRONMENT & ECOLOGY

Discovery of Tenkana: A New Genus of Jumping Spiders in Southern India

Syllabus: Science and Technology, Biodiversity, Environmental Studies

Context: A collaborative team of scientists from India and Canada has identified a new genus of jumping spiders, named Tenkana, in South India.

About Tenkana Genus:

1. New Genus Identification

- **Name Origin:** The genus **Tenkana** is derived from the Kannada word for “south”, reflecting the region of discovery.
- **Significance:** This discovery adds to the known diversity of jumping spiders in India and underscores the unique ecosystems in South India.

2. Species Relocation

- **Tenkana manu** and **Tenkana arkavathi:**
 - These two species, originally categorized under the **Colopsus** genus, have been reclassified under the **Tenkana** genus.
 - **Distribution:** Found across **South India** and **Sri Lanka** (**Tenkana manu**) and in **Karnataka** (**Tenkana arkavathi**).

3. New Species Discovery

- **Tenkana jayamangali:**
 - A newly identified species within the **Tenkana** genus, named after the **Jayamangali river** in Karnataka.
 - **Unique Characteristics:** Distinguished by specific morphological features and localized habitat preferences.

4. Habitat and Distribution

- Unlike other jumping spiders that typically inhabit **forests**, **Tenkana** species are found in **drier, ground-level habitats**.
- **Geographical Range:** Distributed across **Tamil Nadu, Karnataka, Andhra Pradesh, Telangana, and Puducherry**.

Significance of the Tenkana Discovery:

- 1. Enhancing Biodiversity Knowledge:** The identification of Tenkana contributes to the understanding of **India's arachnid biodiversity**, highlighting the unique adaptations of spiders in **arid and semi-arid habitats**.
- 2. Contribution to Taxonomy:** The relocation of species from the **Colopsus genus** to Tenkana emphasizes the importance of taxonomic research, helping **clarify evolutionary relationships** within jumping spiders.
- 3. Ecological Insights: Adaptation to Dry Habitats:** Tenkana species' presence in drier environments offers insights into the **adaptability of arachnids** to varied ecosystems, differing from the forest-inhabiting relatives.
- 4. Conservation Implications:** The discovery of Tenkana, especially in **fragile ecosystems**, underscores the importance of **habitat conservation** for gr

India's Ethanol Blending Program: A Strategic Move Towards Energy Security and Sustainability

Syllabus: *Science and Technology, Energy, Environmental Sustainability*

Context: To meet its rising energy demands and reduce dependency on imported oil, **India has prioritized ethanol blending as a sustainable alternative.** The Ethanol Blending Program (EBP) seeks to **reduce fossil fuel consumption and carbon emissions, aiming for a transformative impact on energy security and environmental goals.**

About the Ethanol Blending Program:

1. Origin and Development

- Launch:** Initiated in **2003** as a pilot project, the Ethanol Blending Program was formalized to support India's **energy and environmental objectives.**
- Purpose:** The program aims to **reduce oil imports, enhance energy security, lower carbon emissions, and boost rural incomes** by benefiting sugarcane farmers.

2. Target and Leadership

- Blending Target:** India targets **20% ethanol blending in petrol by 2025**, advancing from the initial goal of 2030 due to increased production and demand.
- Ministries Involved:** Led by the **Ministry of Petroleum and Natural Gas**, with contributions from the **Department of Food and Public Distribution** and the **Ministry of Environment, Forest, and Climate Change.**

Key Achievements of the Ethanol Blending Program:

- 1. Growth in Ethanol Blending:** Ethanol blending has increased from **1.53% in 2014 to 15% in 2024**, with the government set to reach **20% by 2025.**
- 2. Enhanced Production Capacity: Production Capacity:** Ethanol capacity doubled over four years, reaching **1,623 crore litres in 2024.**

3. **Foreign Exchange Savings and Environmental Impact: Foreign Exchange Savings:** The program has saved **₹1,06,072 crore** in foreign exchange.
 - **Emission Reduction:** Reduced **544 lakh metric tons** of CO₂ emissions, highlighting its environmental benefits.
4. **Economic Impact on Rural Prosperity: Financial Support to Farmers:** Oil Marketing Companies (OMCs) have paid **₹1,45,930 crore** to ethanol producers and **₹87,558 crore** to farmers, promoting economic growth in rural areas.

Challenges Facing the Ethanol Blending Program:

1. **Feedstock Availability: Limited Feedstock:** Dependence on sugarcane as a primary source restricts the scale of ethanol production.
2. **Infrastructure Gaps: Logistical Challenges:** Limited infrastructure for **ethanol storage, transportation, and blending** hampers efficient distribution.
3. **Technological Constraints: Need for Advancements:** Current technology limits the efficient use of **diverse feedstocks** such as lignocellulosic biomass.
4. **Regulatory and Inter-State Barriers :State Regulations:** Variations in state-level regulations and taxes create challenges in **inter-state ethanol trade**.

Key Measures to Enhance the Ethanol Blending Program:

1. **Pradhan Mantri JI-VAN Yojana (Modified)**
 - **Extended Timeline:** Expands the program's scope to include **advanced biofuels** with a new timeline up to **2028-29**.
2. **Roadmap for 20% Blending**
 - **Strategic Plan:** A structured approach to achieving **20% ethanol blending by 2025**, ensuring efficient implementation.
3. **Tax Reductions**
 - **GST Cut:** Reduced GST on ethanol to **5%**, making it financially viable for producers and consumers.
4. **Interest Subvention**
 - **Production Capacity Support:** Subsidies provided to increase production capacity.
5. **Free Movement of Ethanol**
 - **Inter-State Movement:** Adjusted regulations to ease the **inter-state transport** of ethanol, facilitating broader distribution.

Emissions Gap Report 2024

Syllabus: *Environment, Climate Change, International Relations*

Context: The Emissions Gap Report 2024, an annual publication by the UN Environment Programme (UNEP), has raised concerns about the Paris Agreement target to limit global warming to 1.5°C. The report highlights the increasing emissions gap and calls for urgent, ambitious actions to prevent dangerous levels of warming.

Key Findings of Emissions Gap Report 2024:

1. Increase in Global GHG Emissions

- **GHG Emissions Growth:** Global greenhouse gas (GHG) emissions increased by **1.3% in 2023**, with notable contributions from **China (5.2%)** and **India (6.1%)**.

2. Paris Agreement Targets Under Threat

- The report warns that without **rapid and substantial reductions**, the goal of limiting temperature rise to **1.5°C** will be unattainable in the coming years.
- **Projected Warming:** If current trends continue, the world is on track for a temperature increase of **2.6-3.1°C** by the end of the century.

3. Necessary Emissions Reductions

- **Emissions Reduction Goals:** To stay on the 1.5°C path, a **42% reduction in GHG emissions by 2030** and **57% by 2035** is essential. Current plans only aim for a **10% reduction by 2030**, indicating a significant shortfall.

4. Financial Requirements

- **Investment Needs:** Achieving the required emissions reductions would need an estimated **\$200 per ton of CO₂**, amounting to a significant **financial commitment** to bridge the gap by **31 billion tonnes** by 2030.

About the Emissions Gap Report:

1. Publisher and Title

- **Publisher:** **United Nations Environment Programme (UNEP)**
- **Title:** "Emissions Gap Report 2024: No More Hot Air...Please!"

2. Purpose

- This annual report assesses the **difference (gap) between current and required emission levels** needed to meet the **Paris Agreement goals**.

3. Focus Areas of the 2024 Report

- **NDC Review:** Examines new **Nationally Determined Contributions (NDCs)** due by 2025, evaluating their potential impact on emissions.
- **Required Reduction Rate:** Calls for a **7.5% annual reduction in emissions** through 2035 to achieve the 1.5°C target.
- **Policy and Financial Commitments:** Emphasizes the need for **enhanced financial, policy, and technological efforts** to close the emissions gap.

Challenges and Implications of Meeting Emissions Targets:

1. Insufficient Current Commitments

- The report highlights that **current commitments** fall short of the required levels, with only **10% reduction** targeted by 2030 compared to the necessary **42% reduction**.

2. Financial and Technological Barriers

- **Investment Requirements:** With substantial investment needed, financial commitment from governments and private sectors becomes critical.
- **Technological Advancements:** Adoption of **low-carbon technologies** and sustainable practices will be essential for achieving emission cuts.

3. International Coordination and NDCs

- The report calls for **global collaboration** in updating NDCs by 2025, focusing on **increased ambitions and implementation** strategies.

Way Forward:

1. **Strengthened Policy Frameworks:** Governments should enhance **climate policies** to ensure a **7.5% annual reduction** in emissions, in line with UNEP's recommendations.
2. **Increased Financial Investments:** Encourage **public-private partnerships** and mobilize funds for **climate resilience projects** and low-carbon infrastructure.
3. **Technological Innovation**
4. ; Invest in **research and development** for carbon capture, renewable energy, and energy efficiency technologies to drive emission reductions.
5. **Transparent Monitoring and Reporting**
6. ; Countries should adopt **robust monitoring and reporting mechanisms** to track progress on emissions and hold parties accountable to their NDCs.

COP-29 Summit: Addressing Budget Shortfalls in UNFCCC for Effective Climate Action

Syllabus: *Climate Summit, International Relations, Environment*

Context: The UN Framework Convention on Climate Change (UNFCCC) is experiencing a budget shortfall, significantly affecting its ability to conduct climate negotiations and support essential climate initiatives, including preparations for the COP-29 Summit in 2024-25.

UNFCCC's Payment System:

1. Core Budget

- **Source:** Mandatory contributions from member countries, based on each country's **economic size and capacity**.
- **Purpose:** Funds core operational costs and essential UNFCCC activities.

2. Supplementary Fund

- **Source:** Voluntary contributions aimed at covering additional needs, such as **COP events** and specific programs, including subsidies for diplomats from **lower-income countries**.

- **Allocation Flexibility:** Member countries can specify the use of these funds, though preferences are typically **non-binding**.

Current Budget Challenges Facing UNFCCC:

1. Delays and Shortfalls

- **Major Delays:** Contributions from major economies like the **U.S. and China** have been delayed, resulting in a **€57 million shortfall** in 2024.

2. Operational Disruptions

- The financial strain has led to **reduced activities**, including cutting regional events and **limiting travel funding** for poorer nations.

3. Reliance on Voluntary Contributions

- Increasing reliance on **voluntary funds** introduces **unpredictability** in fund availability, impacting the organization's stability.

4. Transparency and Efficiency Concerns

- Delays and earmarked spending in supplementary funds reduce **planning efficiency** and limit flexibility in project execution.

Impact of the Budget Shortfall on UNFCCC Operations:

1. **Reduced Global Climate Action:** Shortages hinder **global climate negotiations**, slowing progress on **emission reduction** and **adaptation efforts**.
2. **Limited Representation for Developing Nations:** The lack of funding for travel subsidies restricts the participation of **lower-income countries** in climate decision-making, impacting **equitable representation** at COP summits.
3. **Operational Cuts:** Budget cuts force the cancellation of **regional climate summits** and events, reducing momentum for regional climate actions and investment mobilization.
4. **Staffing and Operational Efficiency:** Short-term contracts due to budget gaps affect **staff stability**, reducing efficiency in supporting **long-term climate action** projects.
5. **Uncertain Climate Investments:** Funding delays from major contributors discourage **potential investors** and complicate climate finance flows essential for achieving global climate targets.

Way Forward:

1. **Ensure Timely Obligatory Contributions:** Strengthen compliance for **core budget payments**, ensuring they are completed promptly to maintain UNFCCC operations without disruptions.
2. **Flexible Management of Supplementary Funds:** Streamline **voluntary fund management** to improve allocation flexibility and reduce reliance on **earmarked spending requests**.
3. **Increase Core Budget Contributions:** Consider **higher obligatory funding levels** to meet rising climate action demands, thereby reducing the dependency on voluntary contributions.
4. **Enhance Budget Transparency and Efficiency:** Implement recommendations from UN audits to ensure **efficient resource use**, effective project execution, and **accountability in fund allocation**.

Hwange National Park: Zimbabwe's Conservation Hub and the Challenges of Wildlife Protection

Syllabus: *Environment, Biodiversity, Conservation Efforts*

Context: Hwange National Park, Zimbabwe's largest wildlife reserve, was recently in the spotlight due to the discovery of three poached lions. The incident underscores the ongoing challenges of poaching and conservation in Africa's protected areas.

About Hwange National Park:

1. Location and Size

- **Location:** Situated in **northwest Zimbabwe**, close to the main road connecting **Bulawayo and Victoria Falls**.
- **Size:** Covers around **14,600 square kilometers**, making it the **largest natural reserve** in Zimbabwe.

2. History

- **Establishment:** Founded in **1928** and originally called the **Wankie Game Reserve**.

3. Wildlife Diversity

- **Species Richness:** Home to over **100 mammal species** and **400 bird species**.
- **Large Herbivores and Carnivores:** Includes 19 large herbivores and eight large carnivores.
- **Elephant and Lion Populations:** Hosts about **50,000 elephants** (half of Zimbabwe's elephant population) and over **500 lions**.

Conservation Efforts in Hwange National Park:

1. Regional Collaboration

- **Kavango-Zambezi Transfrontier Conservation Area (KAZA):** Hwange is part of KAZA, a **transnational conservation initiative** involving **five Southern African nations** (Angola, Botswana, Namibia, Zambia, and Zimbabwe) focused on creating cross-border wildlife corridors and protecting shared ecosystems.

2. Anti-Poaching Technologies

- **Use of Drones and Technology:** To counter poaching, the park utilizes **drones and other technological tools** to monitor wildlife and deter illegal activities.

Threats to Hwange National Park:

1. Poaching

- **Continued Threat:** Despite conservation efforts, poaching remains a threat, targeting high-value species like **lions, elephants, and rhinos**.

2. Trophy Hunting

- **Impact on Wildlife:** Trophy hunting of species like lions poses a conservation challenge, impacting biodiversity and sparking ethical concerns around wildlife protection.

Periyar Tiger Reserve (PTR) and Buffer Zone Challenges

Context: Residents of **Pampa Valley** and **Angel Valley** in Kerala's **Erumely panchayat** are facing challenges due to **wildlife threats** and recent **buffer zone demarcations** around the **Periyar Tiger Reserve (PTR)**.

Places in News:

- **Pampa Valley & Angel Valley:** Located near PTR; residents are affected by wildlife threats and the **buffer zone designations**.
 - **Historical Significance:** Known for their ties to the **“Grow More Food” campaign** of 1947-48, aimed at supporting post-war veterans.
- **Mookanpetty Causeway:** A bridge over the **Azhutha River**, marking a boundary between **populated areas and PTR wilderness**, symbolizing the divide between local communities and forest areas.

About Periyar Tiger Reserve (PTR):

- **Location:** Situated in the **Idukki and Pathanamthitta districts of Kerala**.
- **Formation:** Established in **1950** as a wildlife sanctuary and declared a **Tiger Reserve** in **1978**.
- **Drainage:** Major rivers include the **Periyar and Mullayar**.
- **Unique Flora:** Contains medicinal plants like **Syzygium periyarensis**, **Habenaria periyarensis** (an orchid), and **Mucuna pruriense thekkadiensis**.
- **Indigenous Communities:** Home to **six tribal communities**—Mannans, Paliyans, Malayarayans, Mala Pandarams, Uralis, and Ulladans—living within the reserve.

Wisdom leads to success

BIOTECHNOLOGY & HEALTH

India's Progress Towards Eliminating Kala-azar: Key Insights and Challenges

Syllabus: Health and Disease Management, Public Health Initiatives, Communicable Diseases

Context: India is nearing the elimination of Kala-azar (Visceral Leishmaniasis) as a public health issue, sustaining fewer than one case per 10,000 people over two years, a critical criterion for WHO certification.

Current Status of Kala-azar in India:

1. Cases and Mortality Trends

- **2023:** Recorded **595 cases** and **4 deaths**.
- **2024:** Cases have declined to **339** with **one recorded death** so far, showing significant progress.

2. Eligibility for WHO Certification

- India is on track to qualify for WHO's **Kala-azar elimination certification**, provided cases remain under **one per 10,000** people for another consecutive year.

3. High-Risk Regions

- States with high incidence rates include **Bihar** (over 70% of total cases), followed by **Jharkhand**, **West Bengal**, and parts of **Uttar Pradesh**.

About Kala-azar (Visceral Leishmaniasis):

1. **Disease Origin:** Caused by the **Leishmania donovani** parasite, Kala-azar is a **protozoan infection** affecting the internal organs, particularly the spleen and liver.

2. **Transmission:** The disease spreads through the bite of an infected female **sandfly** (Phlebotomus argentipes in India).

3. **Vector Characteristics:** The **sandfly** thrives in **humid** environments with **poor sanitation**, facilitating the disease's spread in vulnerable regions.

4. Symptoms

- Symptoms include:
 - Persistent **fever**
 - Noticeable **weight loss**
 - Enlarged **spleen** and **liver**
 - Severe **anemia**
- **Fatality Rate:** If untreated, Kala-azar has a mortality rate exceeding **95%**.

5. Diagnosis

- **Clinical Symptoms:** Fever, splenomegaly, anemia.
- **Diagnostic Tests:** Parasitological tests or serological methods, such as the **rK39 diagnostic kit**, are used for confirmation.

6. Treatment

- Anti-parasitic drugs are available, including:
 - **Amphotericin B**
 - **Miltefosine**
 - **Sodium Stibogluconate**

Challenges and Way Forward:

1. **Sustaining Low Case Rates:** Maintaining the low incidence is critical for WHO certification, requiring **continued surveillance** and **rapid response** to cases.
2. **Focusing on Vulnerable Regions:** States with high cases, particularly **Bihar** and **Jharkhand**, need targeted interventions, including **vector control** and **community awareness** programs.
3. **Improving Sanitation and Living Conditions:** Addressing **poor sanitation** and **humid environments** in affected regions can help reduce the breeding grounds for sandflies.
4. **Access to Treatment and Diagnostics:** Ensuring **affordable treatment** and **widespread diagnostic availability** is essential to prevent fatalities and control spread in high-risk areas.
5. **Enhanced Public Health Infrastructure:** **Strengthening healthcare infrastructure** in rural and endemic regions will support the efficient diagnosis, treatment, and monitoring of Kala-azar cases.

E. coli Outbreak and Food Safety Concerns

Context: A recent **E. coli outbreak in the U.S.** linked to McDonald's burgers has led to one death and the hospitalization of 10 others, raising alarms about **food safety** and infection risks.

About E. coli:

- **Definition:** **Escherichia coli (E. coli)** is a bacterium commonly found in the intestines of humans and animals, with most strains being harmless, but some causing severe illness.
- **Toxin Production:** Dangerous strains produce **Shiga toxins** that damage the small intestine, leading to symptoms like diarrhea.
- **Common Symptoms:** Diarrhea (often bloody), stomach cramps, fever, and nausea.
- **Transmission:** Spread through **contaminated food, water, or contact with infected humans or animals**.
- **Most Known Strain:** **E. coli O157** is notorious for causing severe infections.
- **Complications:** In rare cases, can lead to **hemolytic uremic syndrome (HUS)**, a serious condition causing kidney failure.
- **Treatment:** Most cases resolve naturally, but **hydration** is essential, and severe cases require medical intervention.

National Pharmaceutical Pricing Authority (NPPA)

Context: The National Pharmaceutical Pricing Authority (NPPA) recently raised the ceiling prices of eight essential drugs by **50%** due to “extraordinary circumstances” to ensure their accessibility.

Rules and Laws for Price Revision:

- **Para 19 of DPCO 2013:** Allows price revision during extraordinary circumstances.
- **Essential Commodities Act:** Empowers regulation to ensure affordability and availability.
- **Annual Price Revision:** Usually based on the **Wholesale Price Index (WPI)** of the previous year.
- **Extraordinary Circumstances:** Invoked when market conditions require regulation to maintain drug availability.

About National Pharmaceutical Pricing Authority (NPPA):

- **Origin:** Established on **August 29, 1997**, to control the prices of drugs and medical devices.
- **Ministry:** Functions under the **Department of Pharmaceuticals**, Ministry of Chemicals and Fertilizers.
- **Governing Law:** Operates under the **Drugs (Prices Control) Order (DPCO), 2013** and the **Essential Commodities Act**.
- **Functions:**
 - **Price Regulation:** Controls prices of essential drugs and devices to ensure affordability.
 - **Enforcement:** Implements the provisions of the DPCO regarding pricing.
 - **Availability Monitoring:** Ensures that essential medicines are available and addresses shortages.
 - **Data Collection:** Gathers information on production, imports, exports, and market shares.
 - **Advisory Role:** Recommends drug price revisions and policy changes.
 - **Legal Matters:** Manages disputes and legal cases related to pricing and availability.

Wisdom leads to success

SCIENCE & TECHNOLOGY

Solar Radiation Management (SRM) with Diamond Dust: A Potential Geoengineering Solution for Global Warming

Syllabus: *Science and Technology, Environment, Climate Change and Mitigation Strategies*

Context: Recent studies propose spraying diamond dust into the upper atmosphere as a geoengineering strategy to reflect sunlight and reduce global warming, an approach called Solar Radiation Management (SRM).

About Solar Radiation Management (SRM):

1. Definition

- **Solar Radiation Management** involves dispersing **reflective particles** in the atmosphere to **reflect sunlight** away from Earth, reducing surface temperatures.

2. Materials Proposed for SRM

- **Diamond Dust:** High reflectivity makes diamonds an ideal candidate for SRM.
- **Other Materials:** Alternatives include **sulfur dioxide, calcium carbonate, and sodium chloride**, each offering unique reflective properties and varying environmental risks.

3. Nature as Inspiration

- The idea is inspired by volcanic eruptions, like **Mount Pinatubo** in 1991, which released **sulfur dioxide** and naturally cooled the Earth by **0.5°C** by reflecting sunlight.

Spraying Diamond Dust for SRM: How it Works?

1. **Mechanism of Cooling:** **Diamond dust** scattered in the upper atmosphere reflects sunlight and **radiates solar energy back into space**, preventing excess heat from reaching Earth's surface.
2. **Why Diamonds?**
 - **High Reflectivity:** Diamonds are more efficient at **scattering sunlight** than other materials, making them potentially more effective in temperature reduction.
3. **Process and Scale**
 - **Deployment:** The diamond dust would be dispersed into the **stratosphere**, similar to particles emitted during volcanic eruptions, which can cool the planet by reducing sunlight.
 - **Scale:** An estimated **5 million tonnes** of diamond dust would be required annually to reduce global temperatures by approximately **1.6°C**.

Advantages of Spraying Diamond Dust:

1. **High Efficiency in Reflectivity:** Diamonds' high reflectivity allows them to **efficiently scatter sunlight**, potentially offering faster cooling than other materials like sulfur or calcium carbonate.

2. **Potential Rapid Temperature Reduction:** SRM with diamond dust could provide a **quick, temporary solution** to reduce temperatures, offering time to implement long-term climate solutions.
3. **Nature-Inspired Solution:** This approach mimics **volcanic cooling effects** observed after eruptions, a natural phenomenon that has shown global temperature reduction.
4. **Minimal Direct Carbon Emissions:** Using diamonds does not produce **carbon emissions** during deployment, supporting climate change mitigation without adding to the greenhouse effect.

Limitations and Challenges of Spraying Diamond Dust:

1. **Feasibility and Cost**
 - **High Costs:** The financial and logistical demands of producing and dispersing **millions of tonnes of diamond dust** annually are substantial.
 - **Technical Challenges:** Developing the infrastructure for regular dispersion on this scale is still far from feasible.
2. **Unintended Environmental Impacts**
 - **Weather Disruptions:** Large-scale SRM could **alter weather patterns**, impacting rainfall, potentially harming ecosystems, and affecting biodiversity.
 - **Ecosystem Risks:** Changes in sunlight and temperature distribution could disrupt natural habitats, affecting both terrestrial and marine life.
3. **Temporary Solution to Global Warming**
 - **Symptomatic Approach:** SRM addresses the **symptoms of global warming** but does not eliminate greenhouse gases or halt the root causes of climate change.
4. **Ethical and Governance Concerns**
 - **Ethical Issues:** Manipulating Earth's climate on a global scale poses ethical challenges, particularly in its **impact on agriculture, wildlife, and human populations**.
 - **International Governance:** Such large-scale geoengineering efforts raise questions about **global oversight and accountability** to prevent misuse or unintended impacts.

Tech Firms and Small Modular Reactors (SMRs)

Syllabus: *Science and Technology, Energy, Sustainable Development*

Context: Google recently partnered with Kairos Power to source nuclear energy from Small Modular Reactors (SMRs), marking a shift among tech companies toward nuclear energy to power their data centers and operations. This reflects the growing trend of clean energy adoption to meet rising energy demands and carbon-neutral goals.

Key Points on SMRs and Tech Firms' Investments in Nuclear Energy:

1. Google's SMR Agreement

- **Agreement Details:** Google signed a contract to purchase **500 MW of carbon-free energy** from SMRs developed by **Kairos Power** by **2035**.
- **Purpose:** Supports energy-intensive operations, such as **data centers and AI development**, by providing a reliable, round-the-clock power source.

2. Other Tech Companies in Nuclear Energy

- **Microsoft:** Entered a **20-year agreement** with Constellation for **835 MW of carbon-free energy**.
- **Amazon:** Collaborated with **Energy Northwest, X-energy, and Dominion Energy** on SMR projects aimed at powering data centers.
- **OpenAI:** CEO **Sam Altman** is backing Oklo, which plans to launch a commercial **microreactor by 2027**.

Why Nuclear Energy?

- **Reliable and Continuous Power:** Nuclear power provides **24/7 energy**, unlike intermittent sources like solar or wind, ideal for data centers and AI operations.
- **Carbon-Free Energy:** Nuclear energy produces no **greenhouse gas emissions** during operation, aligning with **carbon neutrality goals** and supporting global **decarbonization**.

Advantages of Small Modular Reactors (SMRs):

1. **Lower Costs:** SMRs have potentially **lower building and operational costs** compared to traditional nuclear reactors due to their smaller size and modular nature.
2. **Scalability and Flexibility:** With **compact designs**, SMRs can be deployed in regions unsuitable for large nuclear plants, increasing flexibility in **site selection** and **energy access**.
3. **Carbon-Free Energy Source:** As a clean energy source, SMRs generate **zero greenhouse gas emissions** during operation, contributing to a **sustainable energy transition**.

Positives of Tech Companies' Investment in Nuclear Energy:

1. **Supporting the Clean Energy Transition**
 - Tech firms' investments in SMRs foster a **shift from fossil fuels** to sustainable energy sources, contributing to **global decarbonization efforts**.
 - **Example:** Google's SMR deal helps offset the emissions of its data centers, which require substantial energy.
2. **Enhanced Energy Reliability**
 - Nuclear energy provides **continuous power**, ensuring stability for operations that depend on a consistent power supply, like data processing and storage.
 - **Example:** Microsoft's SMR agreement ensures a steady energy supply for its vast operations.
3. **Driving Technological Innovation**
 - Partnering with nuclear startups accelerates **innovation in energy technology**, fostering advancements in **SMRs and microreactors**.
 - **Example:** OpenAI's support for Oklo aids in commercializing microreactors, potentially launching by **2027**.
4. **U.S. Global Leadership in Nuclear Technology**
 - The U.S. government backs tech companies' nuclear ventures, aiming to **re-establish leadership in nuclear technology**, competing with countries like **China and Russia**.
5. **Sustainability Commitments**

- Nuclear energy aligns with corporate **sustainability goals**, aiding companies in reducing emissions across their logistics and data center operations.
- **Example:** Amazon's SMR partnerships target emissions reduction throughout its extensive infrastructure.

Challenges and Risks of Nuclear Energy in Tech Industry:

1. Public Perception and Trust Issues

- **Controversial Reputation:** Historical accidents like **Chernobyl** and **Fukushima** have created public skepticism and concerns about nuclear energy safety.
- **Example:** Environmental groups like **Friends of the Earth** continue to raise concerns about the nuclear industry's risks.

2. High Costs and Project Delays

- Although SMRs are cost-effective to operate, **construction costs and potential delays** remain substantial challenges.
- **Example:** Oklo's microreactor might encounter delays, possibly pushing its commercial debut beyond **2027**.

3. Safety Concerns

- Despite advancements, the potential for **accidents or malfunctions** remains a major concern.
- **Example:** The **Three Mile Island** accident in 1979 serves as a reminder of the inherent risks of nuclear reactors.

4. Nuclear Waste Management

- **Long-Term Storage:** Managing nuclear waste is a persistent issue, with no universally accepted solutions for safe, long-term disposal.
- **Example:** Current nuclear projects need to develop sustainable waste management plans to address environmental impacts.

5. Vulnerability to Natural Disasters

- Nuclear infrastructure in **disaster-prone regions** can pose risks during events like **tsunamis or earthquakes**.
- **Example:** The Fukushima disaster demonstrated the dangers of nuclear plants located in regions susceptible to natural disasters.

ESA's Moonlight Programme

Syllabus: *Science and Technology, Space Exploration, International Cooperation*

Context: The European Space Agency (ESA) recently announced the Moonlight Lunar Communications and Navigation Services (LCNS) programme at the International Astronautical Congress. This initiative aims to establish a communication and navigation network on the Moon.

About the Moonlight Programme:

1. Purpose

- The Moonlight programme aims to create a **constellation of lunar satellites** to support **autonomous landings, high-speed communication, and mobility** on the lunar surface.

2. Satellite Constellation

- Approximately **five lunar satellites** will enable long-distance **data transfer** between **Earth and the Moon**, spanning a distance of around **400,000 km (250,000 miles)**.

3. Timeline

- **2026:** Launch of **Lunar Pathfinder**, a communications relay satellite built by **Surrey Satellite Technology Ltd.**
- **2028:** Initial Moonlight services expected to begin.
- **2030:** Full operational capability targeted for the constellation.

4. Targeted Areas

- The primary focus is on the **Moon's South Pole** due to its **unique lighting conditions** and the potential presence of **water ice** within permanently shadowed craters, crucial for future lunar habitats.

5. Collaborative Efforts

- ESA will collaborate with **global space agencies**, including NASA's **Artemis programme** and **Artemis Gateway project**, to establish a **shared lunar infrastructure** for scientific and exploration missions.

Significance and Future Impact of the Moonlight Programme:

1. **Enhanced Lunar Operations:** A dedicated lunar **communications and navigation network** will allow **precise autonomous landings**, increased **mobility**, and real-time data transfer, enabling safer and more efficient lunar exploration.
2. **Support for Lunar Missions:** By providing a **reliable communications infrastructure**, Moonlight reduces the need for each mission to carry standalone systems, allowing mission teams to focus more on **astronaut safety, robotics, and scientific operations**.

3. **Facilitating Lunar Science and Exploration:** With access to **continuous high-speed communication** and navigation, lunar missions can conduct more complex operations and **longer-duration explorations**, particularly in resource-rich areas like the **South Pole**.
4. **International Collaboration and Shared Infrastructure:** Moonlight's partnership with the **Artemis programme** encourages a **cooperative approach** to lunar exploration, enhancing resources and reducing costs through **shared infrastructure**.
5. **Catalyst for Future Lunar Economy:** By establishing a **sustainable communication framework**, Moonlight could pave the way for a future **lunar economy**, supporting **commercial and scientific missions** as well as potential **habitats** on the Moon.

Green Hydrogen Fuel Cell Bus

Syllabus: *Science and Technology, Environment, Renewable Energy, Sustainable Mobility*

Context: Union Minister and Bhutan Prime Minister Tshering Tobgay **recently experienced a ride** on a green hydrogen-powered bus in New Delhi, **highlighting India's commitment to sustainable mobility and a green energy future.**

About Green Hydrogen Fuel Cells:

1. Definition and Benefits

- **Green Hydrogen Fuel Cells** are highly efficient, environmentally friendly devices that generate **electricity from hydrogen** produced using **renewable energy sources** like wind, solar, or hydropower.
- **Zero Emissions:** Producing green hydrogen results in **no greenhouse gas emissions**, aligning with global sustainability goals and climate action.

Key Components of a Green Hydrogen Fuel Cell:

1. Green Hydrogen:

- **Production Process:** Generated through **electrolysis**, where water (H₂O) is split into **hydrogen (H₂)** and **oxygen (O₂)** using renewable energy. This process ensures that hydrogen is produced in an eco-friendly manner, avoiding carbon emissions.

2. Fuel Cell:

- **Electrochemical Device:** A fuel cell converts **chemical energy from hydrogen directly into electrical energy** through an electrochemical reaction.
- **Structure:**
 - **Anode** (positive side) and **Cathode** (negative side).
 - An **electrolyte** sits between the electrodes, enabling the movement of ions and facilitating the reaction.

How the Green Hydrogen Fuel Cell Works:

1. **Hydrogen Supply:** **Green Hydrogen** is fed into the **anode** of the fuel cell, where hydrogen molecules split into **protons (H⁺)** and **electrons (e⁻)**.

2. **Electric Current Generation: Electron Flow:** The electrons move through an **external circuit** from the anode to the cathode, creating an **electric current**. This electricity can then be used to power vehicles, such as buses, or even stationary power systems.
3. **Water as Byproduct:** At the **cathode**, oxygen (from the air) combines with **protons** and **electrons** to produce **water vapor (H₂O)** as the only byproduct, along with heat, making it a **clean energy source**.

Significance of Green Hydrogen Fuel Cell Buses in India:

1. **Promoting Sustainable Mobility:** Hydrogen fuel cell buses represent a major shift toward **sustainable public transportation**, reducing reliance on fossil fuels and **cutting down on urban pollution**.
2. **Alignment with Climate Goal:** As a **zero-emission technology**, green hydrogen fuel cells support India's commitment to **carbon reduction** targets under international agreements, including the **Paris Agreement**.
3. **Energy Security and Independence:** Green hydrogen, produced domestically from renewable resources, enhances **energy security** by reducing dependence on imported fossil fuels and supporting **local energy production**.
4. **Environmental Benefits: Water Vapor Emissions:** With water as the only byproduct, fuel cell buses significantly reduce **air pollutants**, improving air quality in cities and contributing to a **healthier urban environment**.
5. **Paving the Way for Green Economy:** Green hydrogen fuel cell adoption supports the development of **green infrastructure**, job creation in **renewable energy sectors**, and can position India as a leader in **clean technology**.

Mission Mausam and India's Advanced Cloud Chamber

Syllabus: *Science and Technology, Environment, Climate Change and Meteorology*

Context: India launched Mission Mausam, a **weather modification initiative aimed at improving weather forecasting and managing events like rainfall and fog**. To support this, the Indian Institute of Tropical Meteorology (IITM) in Pune is **developing a convective cloud chamber to enhance the understanding of Indian monsoon clouds**.

About the Cloud Chamber:

1. **Definition:** A **cloud chamber** is a closed, drum-like structure where **water vapor, aerosols, and particles** are injected, allowing scientists to study **cloud formation** under controlled conditions of **humidity and temperature**.
2. **Purpose of India's Cloud Chamber:** India's chamber, unlike basic cloud chambers in other countries, will incorporate **convection properties** to simulate **Indian monsoon clouds** and various weather phenomena specific to the region.
3. **Functionality:** The cloud chamber will enable researchers to study:
 - o **Cloud Behavior:** Observing how clouds form and dissipate under different atmospheric conditions.

- **Rain Formation:** Understanding the processes of **rainfall initiation** in Indian monsoon clouds.
- **Particle Interactions:** Examining how particles within clouds interact, influencing cloud lifespan and rainfall.
- **Cloud-Seeding Techniques:** Testing cloud-seeding methods under conditions that mimic **Indian weather systems**.

About Mission Mausam:

1. *Weather Modification Goals:* The mission aims to manage **weather events** such as **rainfall, hail, fog, and even lightning** by improving **weather modification techniques and forecasting**.
2. *Focus on Cloud Physics:* By advancing **cloud physics research**, Mission Mausam seeks to deepen understanding of **cloud formation and behavior** under Indian weather systems, especially during monsoon season.
3. *Development of a Convective Cloud Chamber:* This unique chamber, simulating **Indian monsoon clouds**, will support better **forecasting and strategic planning** for extreme weather.
4. *Cloud Seeding Initiatives:* Building on previous projects like **CAIPEEX** (Cloud Aerosol Interaction and Precipitation Enhancement Experiment), which yielded promising results for **rainfall enhancement**. However, Mission Mausam recognizes that **cloud seeding alone** cannot completely resolve rainfall deficits, making comprehensive weather research essential.

Significance of the Cloud Chamber and Mission Mausam:

1. **Enhanced Weather Prediction Capabilities:** The convective cloud chamber allows scientists to study **rain formation and cloud behavior** in controlled environments, improving forecasting models tailored to **Indian monsoon dynamics**.
2. **Supporting Agricultural Planning and Disaster Preparedness:** Better understanding of **monsoon patterns** and weather modification will aid **agriculture planning**, disaster readiness, and resource management, crucial for a country dependent on seasonal rainfall.
3. **Boosting Cloud-Seeding Research:** Advanced cloud physics research can optimize **cloud-seeding efforts**, providing viable strategies to **enhance rainfall** where needed, especially in drought-prone regions.
4. **Unique Research on Indian Weather Systems:** As a first-of-its-kind facility, the convective cloud chamber will help India gain **independent meteorological insights**, contributing to **global climate research** from a unique geographical perspective.

Srijan – Center for Generative AI

Syllabus: *Science and Technology, Artificial Intelligence, Innovation in Education and Skill Development*

Context: IndiaAI and Meta **have launched** Srijan, the Center for Generative AI, at IIT Jodhpur **with a mission to boost** open-source AI innovation **in India**. **This initiative, supported by the** All India Council for Technical Education (AICTE), **aims to encourage young developers to utilize** Generative AI **in addressing real-world problems**.

About Srijan – Center for Generative AI:

1. Objective

- **Empowering AI Talent:** Srijan's primary goal is to **equip young AI developers** with resources to work on **Large Language Models (LLMs)**, focusing on sectors like **healthcare, mobility, and education**.

2. Funding and Financial Support

- **Meta's Investment:** Meta has committed **INR 750 Lakhs** over three years to fund **training, research, and workshop activities**, helping to expand India's capabilities in **Generative AI**.

3. Initiatives and Activities

- **Skill Development Programs:** The center will host **Hackathons, Master Training workshops**, and create a **GenAI Resource Hub** for collaboration and skill-building in Generative AI.
- **Collaborative Environment:** Through partnerships with **national and international stakeholders** like Meta, MeitY, AICTE, and academic institutions, Srijan aims to drive innovation and research in Generative AI.

About YuvaAI (Youth for Unnati and Vikas with AI) Initiative:

1. Goal

- **Skilling Young Talent:** YuvaAI is designed to **skill 1 lakh young developers** (ages 18-30) in **Generative AI**, equipping them to address pressing real-world issues.

2. Collaboration

- **Joint Effort:** Launched by Meta, MeitY, and AICTE, YuvaAI focuses on training youth in **open-source LLMs** to foster AI talent in India.

3. Core Activities and Focus Areas

- **Training Programs and Hackathons:** Includes **skilling programs, LLM workshops**, and hackathons, with mentorship and funding for outstanding projects.
- **Sectoral Focus:** YuvaAI targets sectors such as **healthcare, education, agriculture, and smart cities**, aligning AI innovations with **sustainable development goals**.

About AICTE (All India Council for Technical Education):

1. Establishment and Purpose

- **Formation:** Established in **November 1945**, AICTE became a statutory body in 1987 under the **AICTE Act**.

- **Mission:** AICTE aims to promote **coordinated development and quality standards in technical education** across India.

2. Functions and Ministry

- **Accreditation and Quality Assurance:** AICTE accredits undergraduate and postgraduate programs and **guides technical institutions** on maintaining quality standards.
- **Affiliation:** Operates under the **Ministry of Human Resource Development** and is headquartered in **New Delhi**.

Significance of Srijan in India's AI Landscape:

1. **Boost to Self-Reliant AI Development:** Srijan aligns with the **Aatmanirbhar Bharat mission**, focusing on **indigenous AI talent development** through open-source platforms.
2. **Encouragement of Young Talent:** Through **YuvaAI** and initiatives at Srijan, young developers will receive hands-on training in LLMs and Generative AI, preparing them to tackle **national and global challenges**.
3. **Catalyst for Sectoral Transformation:** By targeting specific sectors such as **healthcare, agriculture, and education**, Srijan's innovations have the potential to drive **technological advancements** and **improve efficiency** in these areas.
4. **Collaborative Innovation Model:** With international collaboration, Srijan enhances India's **AI research ecosystem**, attracting investments and strengthening India's role in **global AI development**.

ISRO-DBT Agreement for Bio-experiments on Bharatiya Antariksh Station (BAS)

Context: ISRO and the Department of Biotechnology (DBT) have collaborated to develop bio-experiments for India's planned space station, **Bharatiya Antariksh Station (BAS)**.

Highlights of the ISRO-DBT Agreement:

- **Purpose:** To design biological experiments for BAS and the **Gaganyaan mission**.
- **Areas of Research:**
 - **Impact of Weightlessness:** Studies on muscle health in microgravity.
 - **Algae Research:** For nutrient-dense, long-lasting food sources and potential biofuel applications.
 - **Space Radiation:** Examining radiation effects on astronaut health.
- **BioE3 Initiative:** Supports DBT's **BioE3** policy, which promotes **biomanufacturing** in India across **health, bio-pharma, regenerative medicine, and waste management**.

About BioE3 (Biotechnology for Economy, Environment, and Employment) Policy:

- **Objective:** Aims to boost **biomanufacturing** in India.
- **Focus Areas:**
 - **Bio-based Products:** Production of bio-chemicals, biopolymers, and enzymes.
 - **Climate-Resilient Agriculture:** Strengthens agricultural practices and **carbon capture** methods.
 - **Healthcare and Nutrition:** Focus on biotherapeutics and regenerative medicine.

- **Marine and Space Biotechnology:** Innovations in these fields to broaden biotechnology applications.
- **Support for Innovation:** Establishing **bio-manufacturing hubs, bio-AI centers, and biofoundries.**
- **Employment:** Expansion of bioeconomy sectors to create jobs and promote **green growth.**

About Bharatiya Antariksh Station (BAS):

- **Orbit:** Planned at **400 km** above Earth.
- **Timeline:** Initial module launch by **2028**; full expansion by **2035.**
- **Mission Duration:** Designed for **15–20-day** missions.
- **Structure:** Consists of **command module, habitat module, propulsion systems, and docking ports.**

PERSONALITY IN NEWS

Sardar Vallabhbhai Patel: The Iron Man of India and Architect of National Unity

Syllabus: *Freedom Fighters, Indian Independence Movement, Post-Independence Integration*

Context: In celebration of Sardar Vallabhbhai Patel's 150th birth anniversary, the government has announced a two-year nationwide commemoration beginning on October 31st. Patel's contributions, both pre- and post-independence, were instrumental in shaping modern India's political and territorial integrity.

Sardar Patel's Pre-Independence Contributions:

1. Early Political Involvement and Kheda Satyagraha (1917)

- **Kheda Satyagraha:** Patel's initial engagement in the independence movement, supporting farmers in **Gujarat's Kheda district** by leading a protest against unfair tax collection during a famine.

2. Non-Cooperation Movement (1920–1922)

- **Mobilization:** Patel inspired **300,000 people** to join the movement, advocating **Khadi**, and **boycotting British goods** to support Gandhi's non-violent resistance against colonial rule.

3. Bardoli Satyagraha (1928)

- **Leadership:** Led a successful non-violent protest against increased land revenue assessments, earning him the title "**Sardar**". This movement showcased his ability to mobilize public support and resist injustice.

4. Civil Disobedience Movement and Salt March (1930)

- **Mass Protests:** Joined Gandhi's **Civil Disobedience Movement**, protesting British salt laws, which led to his imprisonment and reinforced his commitment to non-violent resistance.

5. Indian National Congress (INC) Leadership

- **1931 Karachi Session:** As **President of the INC**, Patel played a crucial role in ratifying the **Gandhi-Irwin Pact** and passing key resolutions on **Fundamental Rights** and **Economic Policy**.

6. Quit India Movement (1942)

- **Leadership during Imprisonment:** Despite facing imprisonment, Patel's leadership helped rally mass support for the Quit India Movement, a pivotal point in India's freedom struggle.

Post-Independence Contributions of Sardar Patel:

1. Integration of Princely States (1947-1950)

- **Integration of 565 States:** As India's first Home Minister, Patel achieved the monumental task of integrating over **565 princely states** into the Indian Union, preventing territorial fragmentation.
- **Diplomatic Negotiations and Use of Force:** While he primarily relied on **diplomacy** and **persuasion**, Patel authorized military interventions in **Junagadh** and **Hyderabad** when negotiations failed, ensuring their integration into India.

2. Creation of Indian Administrative Service (IAS)

- **Establishing the "Steel Frame":** Recognizing the need for a unified and efficient administration, Patel helped establish the **IAS**, referring to it as India's "steel frame," essential for maintaining governance and stability.

3. Rehabilitation of Refugees Post-Partition

- **Refugee Assistance:** Patel led efforts to resettle and rehabilitate refugees arriving from Pakistan, ensuring that those displaced received **relief and resettlement** support, helping stabilize the newly independent nation.

4. Reform of Police and Judicial Systems

- **Strengthening Internal Security:** As Home Minister, Patel spearheaded **police reforms** and laid the foundation for **judicial reorganization**, fostering a secure and unified law enforcement framework.

5. Formation of Unified India

- **Internal Governance:** Beyond integrating princely states, Patel played a critical role in developing India's **internal governance framework**, establishing a unified administrative structure for the entire nation.

Sardar Vallabhbhai Patel's Role in India's Territorial Integration:

1. Integration of 565 Princely States

- **Preventing Fragmentation:** Patel's diplomatic efforts ensured the voluntary accession of princely states, preventing the disintegration of India into multiple independent regions.

2. Use of Diplomatic Negotiation

- **Privy Purses and Protection:** Patel offered **privileges and security guarantees** to the princely states, encouraging their peaceful accession to India.

3. Decisive Action in Junagadh and Hyderabad

- **Military Intervention:** In **Junagadh**, where the Nawab sought accession to Pakistan, and **Hyderabad**, Patel authorized military interventions to secure these regions within India's borders.

4. Kashmir Accession

- **Setting Precedent for Accession:** While Patel was less involved in Kashmir's accession, his strategy of integrating princely states laid a framework for handling **complex territorial issues** like Kashmir.

5. Ensuring India's Unity

- **Vision of National Integrity:** Patel's actions were instrumental in defining India's territorial boundaries, shaping the map of **modern India** and securing its territorial unity.

ART & CULTURE

Korowai Tribe of Indonesia

Context: Indian vlogger **Dheeraj Meena** recently documented his visit to Indonesia's **Korowai tribe**, known historically for their unique customs and isolated way of life.

About the Korowai Tribe:

- **Location:** Reside in the **southeastern region of Papua, Indonesia**.
- **Forest Connection:** Depend heavily on the forest for food through **hunting and gathering**.
- **Isolation:** Maintained little contact with the outside world until the **mid-1970s**.
- **Treehouses:** Known for **elevated treehouses** built 8-15 meters above the ground, with some reaching as high as 45 meters.
- **Social Structure:** Egalitarian society with **no formal hierarchy**, emphasizing harmony within the tribe.
- **Cannibalism History:** Historically practiced **cannibalism** for spiritual and social reasons, though this has largely ceased in recent times.

National Mission for Manuscripts (NMM)

Context: The **Union Ministry of Culture** is considering revitalizing the **National Mission for Manuscripts (NMM)** by transforming it into an autonomous body named the **National Manuscripts Authority**.

About National Mission for Manuscripts:

- **Establishment:** Launched in **2003** under the **Ministry of Culture** to preserve India's manuscript heritage.
- **Objective:** To **identify, document, conserve**, and make India's manuscript heritage accessible, with an estimated **10 million manuscripts**.
- **Achievements:**
 - **Metadata Prepared:** Created metadata for **52 lakh manuscripts**.
 - **Digitization:** Digitized over **3 lakh manuscript titles**, though only about one-third are available online.
 - **Conservation Efforts:** Conserved around **9 crore folios** using preventive and curative measures.
- **Scope:** Covers a wide array of **themes, languages, scripts, and calligraphies**, representing one of the world's largest manuscript collections.

