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DEC, 2024

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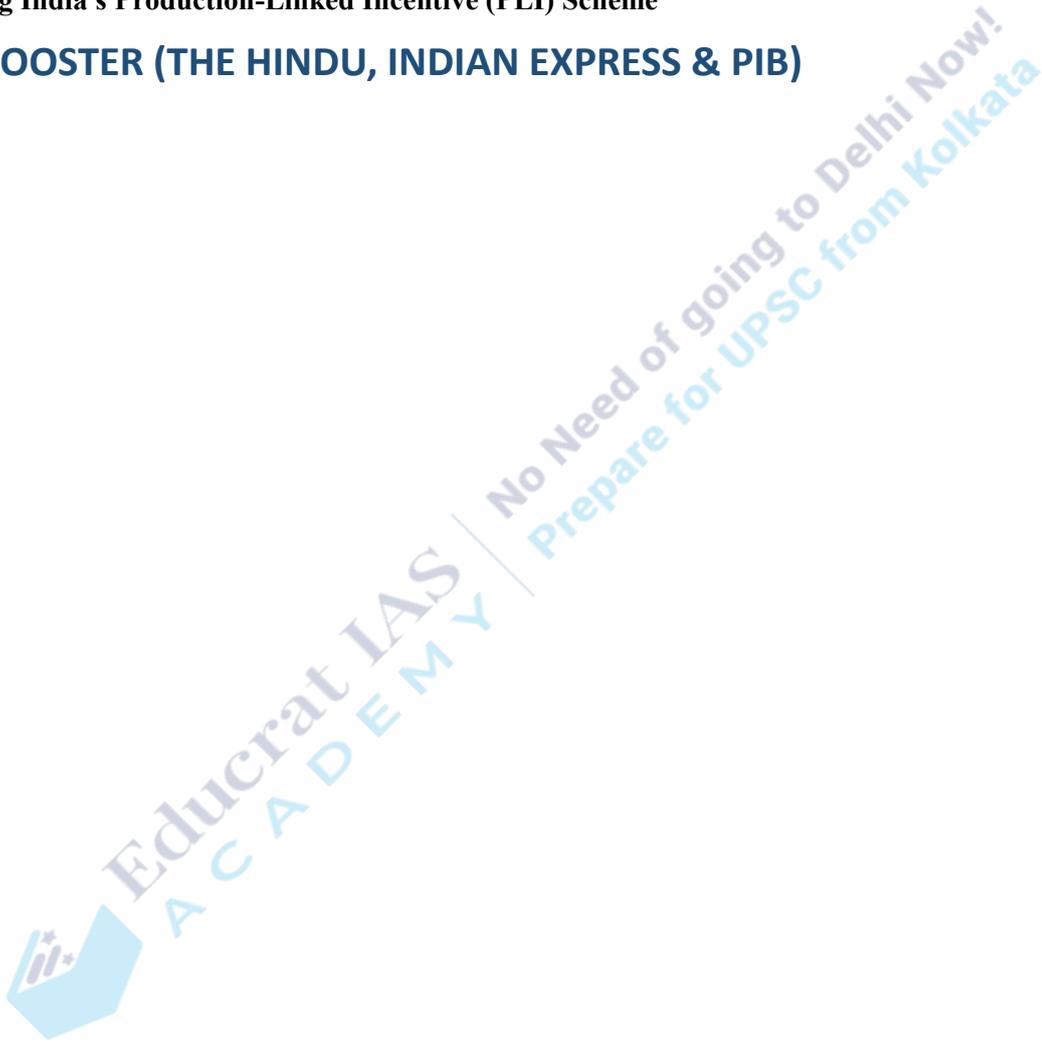
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Mains Daily Analysis

General Studies I

1. Migration Trends in India

Why in News?
- A recent working paper by the Economic Advisory Council to the Prime Minister (EAC-PM), **titled "400 Million Dreams!", sheds light on the evolving migration trends in India.**
- The similar exercise was undertaken in **Economic Survey 2016-17**, when Arvind Subramanian was Chief Economic Advisor, for calculating the migration trends.

What's in Today's Article?
- What are the Migration Trends in India Highlighted in the EAC-PM Report?
- Major Migration Routes and District-Level Insights
- Methodology of the EAC-PM Report and its Limitations
- Conclusion

What are the Migration Trends in India Highlighted in the EAC-PM Report?
- **Top states for migrant destinations:**
  o **West Bengal and Rajasthan** emerged as new hotspots for migrant inflows, joining Uttar Pradesh, Maharashtra, and Madhya Pradesh in the top five states receiving the highest number of 2nd-class railway passengers.
  o **States showing the highest growth in incoming migrants:** West Bengal, Rajasthan, and Karnataka.
  o In contrast, states like **Andhra Pradesh and Bihar** saw a decline in rankings compared to 2012.
- **Decline in overall migration:**
  o The report notes an **11.78% reduction in the overall number of migrants** since the 2011 Census.
  o This decline is attributed to **improved economic opportunities in smaller cities**, reducing the need for long-distance migration.

Major Migration Routes and District-Level Insights:
- **Top state-to-state routes (2023):**
  o Uttar Pradesh to Delhi
  o Gujarat to Maharashtra
  o Telangana to Andhra Pradesh
  o Bihar to Delhi
  o Bihar to West Bengal
- **Top destination districts for migrants:**
  o Mumbai
  o Bengaluru urban
  o Howrah
  o Central Delhi
  o Hyderabad
- **Emerging origin districts (2023):**
  o Villupuram (Tamil Nadu)
  o Saharsa (Bihar)
  o Moradabad (Uttar Pradesh)
  o Murshidabad (West Bengal)
- **Major intra-state movement:** The **Murshidabad-Kolkata route** is the most traveled path for general class passengers, reflecting significant intra-state movement.

- **Migration to major urban centers:**
  o **Delhi:** Major source districts include **Agra, Patna, Kanpur Nagar, Jhansi, and Bareilly**, with new entrants like Dausa (Rajasthan) and Ludhiana (Punjab).
  o **Mumbai: Valsad, Surat, Nashik, Ratnagiri, and Varanasi** remain key origin districts, with Sindhudurg as a notable addition.

Methodology of the EAC-PM Report and its Limitations:
- **Methodology:**
  o The report analyses migration patterns **using Indian Railways' unreserved ticketing data, mobile roaming data, and banking remittance records.**
  o The 2nd-**class in Mail Express and Ordinary trains is the most affordable travel option** predominantly used by blue-collar workers.
- **Limitations:**
  o Lack of **demographic details** (age, gender, reasons for migration).
  o Data captures station-to-station travel rather than actual origin-destination routes.

Conclusion:
- The EAC-PM report provides crucial insights into migration patterns in India, highlighting significant changes in destination preferences and **reduced migration trends due to localised economic opportunities.**
- These findings are **vital for policymakers** addressing urban planning, infrastructure, and economic development.

2. PM lays foundation stone of Ken-Betwa project

Why in news?
Prime Minister Narendra Modi laid the foundation stone for **the Ken-Betwa river-linking project in Madhya Pradesh's Khajuraho.** The **project aims to transfer excess water from the Ken River in Madhya Pradesh to the Betwa River**. It is expected to bring prosperity to the Bundelkhand region.

Ken-Betwa Link Project (KBLP)
- **About**
  o It aims to transfer water from the **Ken River to the Betwa River**, both tributaries of the Yamuna.
  o The project includes a 221-km canal with a 2-km tunnel.
  o The project also includes **a 73.8-meter-high dam on Ken at Daudhan in Madhya Pradesh's Chhattarpur district.**

- **History of the Ken-Betwa interlinking project**
  o The **project was conceptualised in the 1980s** but the water-sharing agreement could not be reached between the two states.
  o The work on the project was originally slated to begin in 2015 but only got a fresh push last year with the government making a revised deal with the two states.
  o Finally, On **March 22, 2021, a memorandum of agreement was signed among the Ministry of Jal Shakti and the governments of Madhya Pradesh and Uttar Pradesh to implement the Project**.
- **Project Phases**
  o **Phase-I:** Construction of the **Daudhan Dam complex**, Low Level Tunnel, High Level Tunnel, Ken-Betwa Link Canal, and powerhouses.
  o **Phase-II:** Construction of Lower Orr Dam, Bina Complex Project, and Kotha Barrage.

- **Completion of project**
  - According to the **Jal Shakti Ministry**, the KBLP project is proposed to be implemented in eight years.
- **Regions Benefiting from the project**
  - The project will benefit the **Bundelkhand region**, which spans 13 districts in Uttar Pradesh and Madhya Pradesh. **Key beneficiary districts include:**
    - **Madhya Pradesh:** Panna, Tikamgarh, Chhatarpur, Sagar, Damoh, Datia, Vidisha, Shivpuri, and Raisen.
    - **Uttar Pradesh:** Banda, Mahoba, Jhansi, and Lalitpur.
  - The **project aims to address water scarcity in this drought-prone region**, fostering development and paving the way for future river interlinking initiatives.
- **Benefits of the Project**
  - **Irrigation:** Annual irrigation for 10.62 lakh hectares (8.11 lakh ha in Madhya Pradesh and 2.51 lakh ha in Uttar Pradesh).
  - **Drinking Water:** Supply for ~62 lakh people.
  - **Power Generation:** 103 MW of hydropower and 27 MW of solar power.

Environmental and social concerns
- **Environmental Impacts**
  - **Deforestation in Panna National Park:** The project will result in large-scale deforestation, with around 98 sq km of the park submerged and 2–3 million trees felled.
- **Threat to Wildlife:**
  - **Tigers:** The **Daudhan Dam, located inside the Panna National Park**, could undermine the successful tiger reintroduction program that revived the population after local extinction in 2009.
  - **Gharials and Vultures:** Likely to affect the Gharial population in the Ken Gharial Sanctuary and disrupt vulture nesting sites downstream.
  - **Hydrological Concerns:**
    - IIT-Bombay scientists warn the project could reduce September rainfall by up to 12% due to disruptions in land-atmosphere feedback.
    - Experts demand transparency in Ken River's hydrological data for a thorough review.
- **Social Impacts**
  - **Displacement:** The dam will displace 5,228 families in Chhatarpur district and 1,400 families in Panna district due to submergence and land acquisition.
  - **Inadequate Compensation:** Protests have erupted over perceived inadequate compensation and minimal benefits for affected communities, particularly in Panna district.

Controversies and Criticism Surrounding the Project
- **Wildlife and Environmental Clearance:** The Supreme Court's Central Empowered Committee (CEC) questioned the wildlife clearance and the project's economic viability.
- **Violation of Precedents:** The Union Environment Ministry approved construction within the core of the Panna Tiger Reserve, despite no precedent for such heavy infrastructure in national parks or tiger reserves.

3. How Regenerative Farming Can Safeguard Our Soil

Context
- **India, with a staggering population of 145 crore, has made significant strides in achieving self-reliance in food and nutrition** over the past seven decades.
- These accomplishments have **primarily been driven by the expansion of agricultural lands and the intensification of practices during the Green Revolution.**
- **Current agricultural systems may fall short of meeting this goal** due to their unsustainable practices and mounting ecological costs.

Challenges of Current Agricultural Practices

- **Soil Degradation**
  - The overuse of chemical fertilisers has caused **significant depletion of soil health.**
  - Over **six decades of reliance on synthetic inputs have reduced the soil organic carbon content from a healthy 2.4% in 1947 to a critically low 0.4% today.**
  - This degradation not only undermines the soil's ability to support crops but also jeopardizes its role in carbon sequestration, further exacerbating climate change.
  - **Soil with organic carbon below the threshold of 1.5% loses its arability,** making it unsuitable for sustainable farming.

- **Economic Costs**
  - The financial burden of soil degradation is staggering. **Over 70 years, the loss of soil organic carbon alone has cost India ₹47.7 lakh crore ($564 billion),** translating to an annual loss of ₹68,243 crore ($8.06 billion).
  - Additionally, **the Indian government spends ₹2 lakh crore ($25 billion) annually on subsidies for synthetic fertilisers.**
  - **These subsidies**, while intended to support farmers, **inadvertently encourage excessive and inefficient use of chemical inputs**, further degrading the soil.

- **Declining Fertiliser Efficiency**
  - The **response ratio of fertilisers has seen a sharp decline** over the decades. In the **1960s, every kilogram of NPK fertiliser produced 12.1 kilograms of grain.**
  - By **2010-2017, this had dropped to just 5.1 kilograms,** signalling diminishing returns on fertiliser use.
  - This **decline is a direct consequence of deteriorating soil health,** making it increasingly difficult to achieve high yields.

- **Environmental Impact**
  - The environmental costs of India's current agricultural practices are profound.
  - The **use of synthetic fertilisers contributes to approximately 25 million tonnes of greenhouse gas emissions annually**, costing the country an additional ₹14,813 crore ($1.75 billion).
  - These **emissions exacerbate global warming and threaten the long-term sustainability of agriculture.**
  - Furthermore, **intensive farming practices deplete natural resources** such as groundwater and reduce biodiversity, compounding the ecological crisis.

- **Food Security Risk**
  - If the current trends persist, **India could face food shortages as early as 2035.**
  - **This risk is driven by a combination of factors: the growing population, increased food demand, declining soil productivity,** and the adverse impacts of climate change.
  - Without immediate intervention to address these issues, **India's ability to feed its citizens will be severely compromised.**

- **Social and Health Costs**
  - Beyond the economic and environmental impacts, **intensive agriculture poses significant social and health challenges.**
  - The **widespread use of chemical inputs has led to contamination of water and food supplies,** adversely affecting public health.
  - Additionally, **the heavy financial reliance on synthetic inputs traps farmers in a cycle of debt, contributing to rural distress and social inequities.**

Necessary Steps to Address these Challenges

- **A Shift Towards Sustainable Agriculture**
  - To address these challenges, **India must transition to a climate-resilient, nature-based agricultural model.**
  - **Such a system prioritises ecological intensification over traditional intensification,** reducing dependence on synthetic inputs while enhancing soil health, biodiversity, and overall productivity.

- o **Regenerative farming, rooted in the principles of agroecology, emerges as a promising alternative.**
- o This **approach reduces input costs, conserves natural resources, and boosts farm productivity**, while also promoting the well-being of farmers and consumers alike.
- **Mainstreaming Regenerative Practices**
  - o The **Prime Minister's National Mission on Natural Farming serves as a critical step** toward safeguarding Indian agriculture.
  - o By mainstreaming regenerative practices, **India can ensure food, nutritional, and ecological security.**
  - o **Studies have demonstrated that community-managed natural farming not only improves agricultural output** but also builds social capital, enhances the health of farming communities, and fosters environmental sustainability.
- **The Need for Evidence and Policy Reform**
  - o For India to fully embrace regenerative farming, **intensive and longitudinal research is necessary across all 15 agro-climatic zones.**
  - o **Such studies will provide scientific evidence of the benefits of regenerative practices,** helping to create awareness and inform policy frameworks.
  - o **Disseminating this evidence will also strengthen political will**, creating the development of large-scale models for adopting sustainable agriculture.
  - o **Agroecological principles must guide this transformation** and these include biological pest control, nutrient cycling, soil health enhancement, and biodiversity conservation.
  - o **A knowledge-intensive approach, supported by participatory and decentralised pedagogies, will empower farmers** to implement these practices effectively.

Way Forward

- **A Radical Transformation in Agriculture**
  - o India's vision of achieving net zero status by 2070 aligns with the goals of redesigning its agricultural systems.
  - o **By focusing on regenerative farming and ecological intensification, India can mitigate the risks of climate change**, reduce hidden costs of agriculture, and ensure long-term food security.
  - o **A radical transformation of the agricultural paradigm**, underpinned by robust evidence and policy support, **is essential to secure the nation's nutritional and ecological future**.
- **Building a Scientific and Policy Framework**
  - o **Redesigning Indian agriculture requires a comprehensive strategy** grounded in scientific evidence and participatory approaches.
  - o **Intensive field research across India's 15 agro-climatic zones is essential** to validate the benefits of regenerative farming and generate localised solutions.
  - o **Public dissemination of this evidence can foster awareness, political will, and policy support** for scaling up sustainable practices.
  - o Moreover, **knowledge-intensive systems supported by decentralised pedagogies can empower farmers** with the skills and resources to adopt agroecological principles.

Conclusion

- **India stands at a crossroads in its agricultural journey and the current model of intensive agriculture is unsustainable and poses significant risks** to food security, ecological balance, and economic stability.
- A **radical shift towards regenerative and ecological farming is the need of the hour** because regenerative farming holds the key to balancing productivity with environmental stewardship.
- **By embracing this transformation, India can ensure its agricultural system remains resilient, productive, and sustainable, securing a healthier and more prosperous future** for its people and the planet.

4. How Does La Nina Affect India's Climate

What is La Niña?
- La Niña is a phase of the **El Niño-Southern Oscillation (ENSO)** that occurs when **sea surface temperatures** in the **eastern and central Pacific Ocean** become cooler than usual.
- It is the opposite of **El Niño**, which brings warming in the same region. Both phases significantly influence **global weather patterns**.

How La Niña Affects Global Climate?
- **India**: Promotes **normal to above-normal monsoon rainfall**, leading to better agricultural yields.
- **Africa**: Causes drought-like conditions in certain regions.
- **Atlantic Ocean**: Intensifies **hurricanes**.
- **United States**: Southern states receive **increased rainfall** during La Niña.

La Niña and India's Climate:
- **Winter Effects:**
  o **Colder Winters**: La Niña winters tend to bring **colder nights** in northern India but with slightly higher daytime temperatures.
  o **Wind Speed and Pollution**:
    ▪ **Higher Wind Speeds** help disperse air pollution, improving air quality.
    ▪ **Lower Planetary Boundary Layer Height (PBLH)** may trap pollutants closer to the ground, worsening pollution.
  o **Current Scenario**: In 2024, **La Niña has not yet emerged** as expected, with a 57% probability of it developing later in the year.
- **Monsoons and Summers:**
  o **Enhanced Monsoons**: La Niña years (like **2020-2022**) have resulted in **normal to above-normal rainfall**.
  o **Relief from Heat**: La Niña reduces summer intensity, offering relief from heatwaves seen during **El Niño years**.
  o **El Niño Impact**: El Niño summers are **hotter** and often disrupt the monsoons, leading to droughts. For example, 2023, an El Niño year, saw below-normal rainfall.

Why Is La Niña Delayed in 2024?
- La Niña usually forms during the **pre-monsoon** or **monsoon season**.
- However, in 2024, it has been unusually delayed, with **Oceanic Niño Index (ONI)** hovering at -0.3°C (threshold for La Niña is -0.5°C or lower).
- If La Niña forms, it would bring the following:
  o Cooler winters in **northern India**.
  o Stronger monsoons in **summer 2025**.

Meteorological Indices to Identify La Niña:
- La Niña is declared based on specific indices such as:
  o **Oceanic Niño Index (ONI)**: Measures average sea surface temperature anomalies
  o **Persistence Rule**: Values must consistently stay at or below the threshold (-0.5°C for La Niña) for five consecutive readings.

Climate Change and ENSO Events:
- Climate change is likely to increase the **frequency and intensity** of both La Niña and El Niño events due to rising ocean and atmospheric temperatures.
- Extreme La Niña events could amplify impacts like **harsh winters** and **intense rainfall** in India.

Significance of La Niña for India:
- **Agriculture**: Boosts **crop production** due to strong monsoons, aiding farmers.
- **Water Resources**: Improves reservoir levels, reducing water stress.
- **Energy**: More rainfall ensures better **hydropower generation**.
- **Relief from Heat**: Less severe heatwaves compared to El Niño years.

Conclusion:
- The delayed emergence of La Niña in 2024 has brought uncertainties regarding its impact on winter and monsoons.
- If La Niña sets in early 2025, it could ensure a **strong monsoon season**, crucial for India's agriculture and water resources.
- Monitoring **ENSO patterns** is vital to understanding and preparing for its climatic effects.

5. Arctic ice melting- First ice-free day in the Arctic could come by 2030

Why in news?
A new study published in **Nature Communications suggests the Arctic Ocean could experience its first ice-free day—defined as less than one million square kilometers of sea ice—by 2030** or earlier, driven by unprecedented greenhouse gas emissions.

The analysis warns that while the scenario is unlikely, its plausibility is growing due to continued human-induced climate change.

Arctic sea ice has been shrinking at an alarming rate, with its extent decreasing by 12.6% per decade over the last 40 years—a rate unmatched in at least 1,500 years, according to the MIT Climate Portal's 2023 report.

Arctic Region
- **Introduction**
  o The Arctic region, or the Arctic, is a geographic region spreading around the **North Pole**.
  o It includes the northern parts of **Canada, the United States, Russia, Finland, Sweden, Norway, Iceland, and Greenland.**
  o The Arctic Ocean lies between these lands. An imaginary line, called the Arctic Circle, surrounds most of the area.
    ▪ The **Arctic Circle (66° 33'N) defines the Arctic based on solar radiation.**
- **Geography and Climate**
  o The Arctic consists mainly of **flat, treeless tundras with some mountainous areas**.
  o Much of the ground is permanently frozen, with only the top layer thawing in summer.
    ▪ **Greenland is largely covered by a permanent ice sheet**.
  o **Daylight:** The **North Pole experiences six months of darkness followed by six months of constant daylight, while Arctic lands farther south have shorter periods of daylight in winter and brief darkness in summer.**
  o **Temperature:** Winters are extremely cold, with temperatures reaching −90°F (−68°C) inland, while summers are mild at around 50°F (10°C). Snowfall is heavier near the coasts.
- **Flora and Fauna**
  o **Plants:** Trees are scarce, growing only in southern regions. The tundras **support lichens, mosses, grasses, and some flowering plants.**
  o **Animals:** The Arctic hosts polar bears, caribou, Arctic foxes, Arctic hares, gray wolves, seals, walruses, whales, and various fish. Birds like the snowy owl live year-round, while others migrate during summer.
- **Human Presence**

- o **Indigenous Peoples:** Indigenous groups like the Nenets, Sakha, Evenk, Chukchi, Sami, Inuit, and Aleuts traditionally inhabit the Arctic, living in small settlements.
- o **Settlers:** In the 1900s, industries such as mining and oil drilling attracted settlers of European descent, who established larger towns and cities.

Key highlights of the study
Key Findings
- o **Near-Term Ice-Free Scenario**
  - ▪ Nine simulations projected the **first ice-free day could occur as early as September 2027** if conditions such as an unusually warm fall, winter, and spring, combined with stormy weather, align.
- o **Extended Ice-Free Period**
  - ▪ The simulations suggested the ice-free period could last between 11 and 53 days, potentially leading to the Arctic's first ice-free month.
- o **Timing uncertain**
  - ▪ While the exact timing of the first ice-free day is uncertain, scientists agree it is inevitable unless dramatic reductions in GHG emissions are achieved—a scenario deemed unlikely in the near future.
  - ▪ The occurrence of the first ice-free day may trigger more frequent events in subsequent years.
- • **Driving Factors**
  - o **Unprecedented GHG emissions** are accelerating Arctic Sea ice decline.
  - o Global surface concentrations of **carbon dioxide, methane, and nitrous oxide reached record highs in 2023**, as reported by the World Meteorological Organization (WMO).

What happens if the Arctic becomes ice-free?
- • **Impact on Climate Change**
  - o The loss of Arctic Sea ice accelerates climate change due to the **Albedo effect**, where the **reflective ice is replaced by darker ocean water that absorbs more solar energy.**
  - o This leads to **increased warming in the Arctic**, triggering extreme weather events in mid-latitudes.
- • **Rising Sea Levels**
  - o Global sea levels are already rising at an **accelerated rate of 3.6 mm per year, 1.5 times faster than the 1990s**.
  - o If the Greenland ice sheet melts entirely, sea levels could rise by six meters, threatening coastal communities worldwide.
- • **Ecosystem Disruption**

  - o Species like **polar bears, walruses, Arctic foxes, snowy owls, and reindeer** are at risk due to habitat loss and melting permafrost.
  - o Marine animals are migrating further north for colder waters, **disrupting food chains and dependent species**.
- • **Human and Infrastructure Impact**
  - o The Arctic is warming four times faster than the global average, endangering ecosystems, infrastructure, and livelihoods of Arctic communities.

6. All is Not Well with Soil

Context
- • **The 10th World Soil Day**, celebrated on December 5, 2024, served as **a poignant reminder of the critical role soil health plays in sustaining life on Earth.**
- • Coinciding with this global event, **the Fertiliser Association of India (FAI) hosted its annual seminar on Sustainable Fertiliser and Agriculture,** to discuss the crucial role of fertilisers in nourishing soils and ensuring food security.
- • **This year's theme, Caring for Soils – Measure, Monitor, and Manage, highlighted the urgency of addressing soil degradation** and nutrient deficiencies that jeopardise agricultural productivity.

The State of Indian Soils

- Indian soils are alarmingly deficient in essential nutrients. **Less than 5% of soils have sufficient nitrogen**, **40% are sufficient in phosphate, 32% in potash, and only 20% in organic carbon**.
- Furthermore, **micronutrient deficiencies—such as sulphur, iron, zinc, and boron—range from moderate to severe.**
- Despite these challenges, **India remains a global agricultural powerhouse**, **exporting 85 million tonnes of cereals from 2020-21 to 2022-23** while providing near-free grain to over 813 million people during the pandemic.
- This **success is partially attributed to the efforts of the fertiliser industry, which ensures timely availability of nutrients like nitrogen (N), phosphate (P), and potash (K),** either through domestic production or imports.

An Analysis of Challenges in Indian Fertiliser Sector

- **Imbalance in Nutrient Use**
  - One of the most pressing challenges is the **disproportionate use of nitrogen (N) compared to other essential nutrients** like phosphorus (P) and potassium (K).
  - This **imbalance is primarily a consequence of India's fertiliser subsidy policy,** which heavily subsidises urea **making it significantly cheaper than other fertilisers like DAP** (di-ammonium phosphate) and MOP (muriate of potash).
  - As a result, **farmers tend to overuse urea, prioritising immediate cost savings** over long-term soil health.
  - The **misuse of fertilisers has led to skewed nutrient application** ratios in various states.
  - For example, **Punjab applies 61% more nitrogen than the recommended dose but underuses potash by 89% and phosphate by 8%.**
  - Similarly, **Telangana overuses nitrogen by 54% while applying 82% less potash and 13% less phosphate.**
- **Low Nutrient Use Efficiency (NUE)**
  - India's current fertiliser practices result in low nutrient use efficiency, estimated to be just 35-40%.
  - This means that **more than half of the fertilisers applied to fields are not absorbed by plants**. Instead, they are **lost to the environment in various forms.**
  - **Nitrogen, for instance, escapes into the atmosphere as nitrous oxide**, a potent greenhouse gas with a warming potential 273 times greater than carbon dioxide.
  - **This not only exacerbates climate change but also represents a significant economic loss**, as the unutilised fertiliser fails to contribute to crop yields.
- **Subsidy-Driven Distortions**
  - **The fertiliser subsidy system**, while intended to support farmers, **creates several distortions.**
  - **Urea, which receives the lion's share of the subsidy** (about two-thirds), is priced at approximately **$70 per tonne, the lowest globally.**
  - This **artificially low price incentivises excessive use of urea**, often at the expense of other nutrients.
  - Moreover, **unlike DAP and MOP,** which were brought under the Nutrient-Based Subsidy (NBS) scheme in 2010, **urea remains outside its ambit.**
  - This exclusion has further widened the price gap between urea and other fertilisers, perpetuating imbalanced nutrient use.
- **Diversion and Smuggling of Fertilisers**
  - A **significant portion of subsidised urea**, estimated at 20-25%, is **diverted for non-agricultural purposes or smuggled to neighbouring countries.**
  - **Urea's low cost makes it an attractive input for industries** like plastics and textiles, while its illegal export fetches higher prices in international markets.
  - This **diversion deprives Indian farmers of critical resources and increases the financial burden on the government,** which must compensate for the subsidized urea lost to misuse.
- **Inadequate Focus on Micronutrients**

- While macronutrients like N, P, and K dominate the discourse, micronutrients such as **zinc, boron, sulphur, and iron receive insufficient attention.**
- **These elements**, though required in smaller quantities, **are crucial for plant health and productivity.**
- The **lack of focus on micronutrients has led to widespread deficiencies in Indian soils,** further exacerbating the challenges of declining yields and soil degradation.

Broader Implications of these Challenges

- The cumulative impact of these issues is far-reaching. **Farmers face declining profitability as imbalanced fertiliser use results in suboptimal crop yields.**
- **Soil health deteriorates over time**, reducing the long-term viability of agricultural land.
- On a national scale, **the environmental damage caused by inefficient fertiliser use imposes additional economic and ecological costs.**
- Furthermore, **the inefficiencies in the subsidy system strain government finances, with fertiliser subsidies consuming nearly 4% of the Union budget** in the last fiscal year.

The Need and Key Elements of Policy Reform to Better the Soil Health

- **Rationalizing Subsidies**
  - The current subsidy policy heavily favours urea, making it significantly cheaper than other fertilisers such as di-ammonium phosphate (DAP) and muriate of potash (MOP).
  - **This has distorted the price signals farmers receive**, leading to overuse of nitrogen and underuse of phosphorus and potassium.
  - **The resulting nutrient imbalance diminishes soil fertility,** reduces crop yields, and harms long-term agricultural sustainability.
  - **Reform is essential to rationalise these subsidies** and encourage balanced fertiliser use.
- **Economic Sustainability**
  - Fertiliser subsidies constitute a massive financial burden on the government.
  - In the last fiscal year, **these subsidies amounted to ₹1.88 lakh crore, or nearly 4% of the Union budget.**
  - **Such high expenditure diverts resources from other critical sectors** like health and education.
  - **Reforming the subsidy mechanism could alleviate this fiscal strain** while still ensuring affordability for farmers.
- **Environmental Protection**
  - **Current practices result in low nutrient use efficiency (NUE),** with only 35-40% of fertilisers absorbed by crops.
  - The **remaining portion contributes to environmental pollution**, releasing greenhouse gases like nitrous oxide and contaminating water bodies through nitrogen runoff.
  - **Policy changes could incentivise the adoption of environmentally friendly practices** and reduce these harmful effects.
- **Deregulation of Fertiliser Pricing**
  - A **critical step is to deregulate fertiliser prices**, allowing market forces to determine pricing.
  - **Farmers can be compensated through direct income support**, such as digital coupons or cash transfers, enabling them to purchase fertilisers based on need rather than distorted price signals.
  - **This approach would incentivise the efficient use of nutrients** while promoting innovation and competition within the fertiliser industry.
- **Expansion of the Nutrient-Based Subsidy (NBS) Scheme**
  - While DAP and MOP are already part of the NBS scheme, urea remains excluded.
  - **Bringing urea under the NBS scheme would help correct the price imbalances** between nitrogen, phosphorus, and potassium.
  - **This move could encourage more balanced nutrient use** and reduce the over-reliance on nitrogen.

Conclusion

- **Reforming India's fertiliser sector offers multifaceted benefits. It can enhance agricultural productivity, improve farmers' profitability**, and reduce environmental damage.
- **A balanced and efficient use of NPK and micronutrients will rejuvenate Indian soils**, paving the way for sustainable agriculture.
- Furthermore, **deregulation could elevate the fertiliser industry to global prominence, much like India's pharmaceutical sector in human health.**

7. Row over Tungsten Mining near Madurai

About Tungsten:
- Tungsten is a **rare, heavy, and dense metal with the highest melting point (3,422°C) among all metals**.
- It is known for its exceptional hardness and resistance to heat, corrosion, and wear.
- **Appearance:** Greyish-white, lustrous metal in its pure form.
- **Ore Sources:** Majorly obtained from minerals such as scheelite (calcium tungstate) and wolframite (iron manganese tungstate).
- **Tungsten is considered a "critical mineral"** due to its indispensable role in defense, high-tech industries, and clean energy applications.

Applications:
o **Industrial Tools:**
  - Used in **cutting tools, drills, and abrasives due to its hardness and heat resistance.**
  - Tungsten carbide, a compound of tungsten, is widely used for manufacturing durable tools.
o **Electronics:**
  - Filaments in **light bulbs, X-ray tubes, and electrical contacts**.
  - Semiconductor materials and heating elements in electronics.
o **Aerospace and Defense:**
  - Alloyed with other metals for high-strength military-grade armor and aerospace components.
  - Used in missile tips and radiation shielding due to its density.
o **Medical Applications:**
  - Utilized in **medical imaging devices and as radiation shielding material in cancer treatments**.
o **Green Energy & High-Tech Applications:**
  - Essential in wind turbines and in the production of superalloys for energy and technology sectors.

Tungsten in India:
o **Primary Deposits:**
  - **Rajasthan:** Degana mines in Nagaur district are historically significant for tungsten mining.
  - **Andhra Pradesh:** Scheelite deposits in Srikakulam district.
  - **Karnataka:** Concentrated reserves in **Chitradurga and Mysuru regions.**
o **Current Status:** India imports a significant portion of its tungsten requirements due to limited domestic production.

Global Reserves & Producers:
o **Major Tungsten Reserve-Holding Countries:**
  - **China:** Holds the largest tungsten reserves and accounts for over 80% of global production.
  - **Russia and Canada:** Significant reserves and growing production capacity.
  - **Vietnam, Bolivia, and Austria:** Other notable contributors to tungsten mining.
o **Top Producers:**
  - **China:** Dominates global production due to vast reserves and advanced processing facilities.
  - **Russia:** Increasing production for industrial and defense purposes.
  - **Austria and Bolivia:** Key exporters to international markets.

About the Controversy:
- The Union Ministry of Mines recently awarded tungsten mining rights to **Hindustan Zinc Limited**, a subsidiary of Vedanta Limited, through an auction on November 7, 2024.
- One of the chosen sites was the biodiversity-rich **Melur region in Madurai, Tamil Nadu**.
- The auction was part of Tranche IV under the **Mines and Minerals (Development and Regulation) Act, 1957**, focusing on strategic minerals like tungsten, phosphorite, and vanadium essential for high-tech and green energy applications.
- **Significance of the Mining Site:**
  - The 2,015.51-hectare **Nayakkarpatti tungsten block is known for its deposits of scheelite**, a primary tungsten ore.
  - The Periyar canal has been identified as the water source for mining operations.
  - Despite its resource potential, the site overlaps with biodiversity heritage areas in **Arittapatti and Meenakshipuram villages,** which were designated to protect ecological and cultural assets.

Opposition to the Project:
- **Environmental Concerns:**
  - The **biodiversity heritage site, notified by Tamil Nadu in 2022**, spans 193.63 hectares across Arittapatti and Meenakshipuram villages.
  - Environmentalists argue that **mining could harm flora, fauna, and cultural landmarks**, including ancient temples and Jain relics.
  - Tailings from ore processing may release harmful metals like arsenic, cadmium, and lead, posing risks to human health and the environment.
- **Activist and Public Outcry:**
  - Environmental groups highlighted the potential ecological damage.
  - Activists criticized Vedanta's environmental record, citing pollution from its copper smelting unit in Thoothukudi.
- **Cultural Significance:**
  - The **region is rich in heritage**, and locals fear mining could distort its cultural identity.

Government's Position:
- **State Government's Position:**
  - **Tamil Nadu's Chief Minister M.K. Stalin urged the Union government to cancel the mining rights**, vowing to pass a resolution in the State Assembly to reject the project.
  - The State government claims it informed the Centre about the biodiversity heritage site's existence during land discussions.
- **Union Government's Response:**
  - The Union Ministry of Mines contends there was no opposition from the Tamil Nadu government during the auction process, which began in February 2024.

Conclusion:
- The **tungsten mining project in Madurai underscores the complex balance between resource exploitation and environmental preservation.**
- While the Union government highlights strategic benefits, the Tamil Nadu government and environmental groups emphasize protecting biodiversity and cultural heritage.
- The outcome of this controversy could set a precedent for how India navigates similar resource management disputes in the future.

8. Copper Industry in India

Why in the News?

The Quality Control Order (QCO) on refined copper, effective from December 1, has **barred imports from Japanese suppliers**, who account for **80% of India's copper imports, as they await BIS certification**.

The downstream industry has warned the government of a potential copper supply crunch, which could last for over three months due to the certification delay.

About Copper:

- Copper, known for its **high conductivity, malleability, and corrosion resistance**, plays a crucial role in modern industries.
- India, although not among the largest producers of copper, has a significant copper industry that contributes to various sectors of the economy.
- **Physical Properties**: Malleable and ductile, Resistant to corrosion
- **Recyclability**: Copper is 100% recyclable without any loss in quality, making it an eco-friendly metal.

Applications of Copper:

- **Electrical Industry**: Used in wiring, motors, and transformers due to its high conductivity.
- **Construction**: Roofing, plumbing, and heating systems utilize copper.
- **Automobile Industry**: Essential for wiring, radiators, and connectors.
- **Electronics**: Integrated circuits and semiconductors rely heavily on copper.
- **Renewable Energy**: Crucial for wind turbines, solar panels, and electric vehicles.

How Copper is Mined?

- **Mining Process**:
  o **Open-pit mining**: Common for surface-level deposits.
  o **Underground mining**: Used for deeper deposits.
  o **Leaching**: A chemical process for extracting copper from ores.
- **Refining**: Smelting and electrolytic refining processes are used to obtain pure copper.

Where Copper is Found in India?

- **Major Copper Reserves**:
  o **Rajasthan**: Khetri and Jhunjhunu belt.
  o **Madhya Pradesh**: Malanjkhand mine, the largest open-pit copper mine in India.
  o **Jharkhand**: Singhbhum copper belt.
- **Production Facilities**: Hindustan Copper Limited (HCL) operates key copper mines in these regions.

Largest Exporters of Copper in the World:

- **Chile**: The leading exporter, accounting for over 30% of global production.
- **Peru**: Known for its extensive copper mines.
- **China**: A significant exporter despite being a large consumer.
- **United States**: Major copper reserves in Arizona and Utah.
- **Australia**: A consistent exporter with large mining operations.

Challenges to Copper Production in India:

- **Limited Reserves**: India's copper reserves are not extensive, leading to high import dependence.
- **High Production Costs**: Rising energy and labor costs make domestic production less competitive.
- **Environmental Concerns**: Mining activities lead to deforestation and pollution, triggering opposition.
- **Policy and Regulatory Issues**: Delays in clearances and inconsistent policies hamper growth.

- **Closure of Sterlite Plant**: Until 2018, India was self-sufficient in copper cathode production. The closure of Vedanta's Sterlite plant over environmental violations severely impacted domestic supply, increasing dependency on imports.

Government Initiatives:
- **National Mineral Policy (NMP) 2019**: Aims to promote domestic mining and reduce import dependence.
- **Mining Reforms**: Simplified auction processes and transparent allocation of resources.
- **Renewable Energy Push**: Increased demand for copper due to government incentives for electric vehicles and solar energy.
- **Make in India**: Encourages investment in the copper industry to strengthen domestic manufacturing.

News Summary:
- India's refined copper industry faces significant challenges following the implementation of the Quality Control Order (QCO) on refined copper from December 1, 2023.
- With Japanese suppliers—India's primary source of refined copper imports—awaiting Bureau of Indian Standards (BIS) certification, concerns are mounting about an impending supply crunch that could last over three months.
- **Dependence on Copper Imports:**
  o India imports **30-40% of its refined copper**, with Japanese suppliers accounting for **80% of imports**.
  o In 2023-24, India imported **refined copper worth ₹16,500 crore**, primarily for the manufacture of electrical wires and cables

Impact of Quality Control Order:
o **QCO Requirements**:
  ▪ Refined copper producers must obtain **BIS certification to export to India**.
  ▪ Certification includes a resistivity test, requiring Japanese refiners to conduct tests in BIS-approved labs in India.
  ▪ This test is not a global standard, creating logistical challenges for Japanese refiners.
o **Supply Disruption**:
  ▪ Japanese suppliers ceased shipments in October 2023 to avoid clearance issues.
  ▪ Stakeholders anticipate a 90-day supply gap due to the time needed for certification and shipping.

Consequences of Supply Shortage:
o **Production Halts:**
  ▪ Downstream industries, including wire, cable, and electrical equipment manufacturers, face production disruptions.
  ▪ The shortage could lead to higher input costs and potential project delays.
o **Economic Impact:**
  ▪ Domestic industries reliant on refined copper, including medium and small enterprises, are expected to bear the brunt of the shortage.

Stakeholder Concerns:
o **Industry Feedback:**
  ▪ Downstream user associations have requested a four-month extension for implementing the QCO.
  ▪ Major stakeholders, including the Indian Electrical and Electronics Manufacturers' Association (IEEMA), warned of severe disruptions.
o **Government Delays:**
  ▪ BIS certification applications from seven Japanese firms have been pending since January 2023.
  ▪ The Mines Ministry and BIS have not provided clear timelines for resolving the certification backlog.

Future Prospects:

- o **Adani's Expansion:**
  - Adani's Kutch refinery is expected to ramp up production by 2025, potentially alleviating supply constraints.
- o **Policy Interventions:**
  - Export-oriented units have been exempted from QCO requirements, offering limited relief to exporters.
  - Stakeholders urge the government to expedite BIS certifications and relax QCO requirements temporarily to stabilize the market.

9. Mohan Bhagwat's Three-Child Plan: Why Concern About India's Falling Fertility Rate is Misplaced

Context
- **Demographic trends have traditionally been viewed as slow-moving, resistant to rapid shifts** like socioeconomic indicators.
- However, **concerns around fertility rates in India have sparked significant debate**, ranging from fears of labour shortages to imbalances in political representation.
- Therefore, **it is crucial to examine these concerns, the proposed remedies, and explore viable pathways to address India's demographic and socioeconomic challenges.**

Shifting Demographic Narratives
- India has witnessed a **dramatic shift in its demographic discourse.**
- Where unchecked fertility rates were once perceived as a threat to development, **the narrative now includes fears of labour shortages due to falling fertility rates.**
- Notably, **concerns about regional imbalances in political representation and economic disparity have gained prominence.**
- However, **the implications of achieving below-replacement fertility rates have not been adequately scrutinised** before advocating measures to increase fertility.

Why Advocacy for Higher Fertility is Misguided and Economic Risks of Over emphasising Population Growth
- **Ignoring the Consequence of Overpopulation and Resource Strain**
  - o India is already grappling with a **population expected to exceed 1.6 billion by 2060.**
  - o This **massive number places enormous pressure on the country's resources, infrastructure, and social services,** particularly in economically weaker states like Bihar, Uttar Pradesh, and Jharkhand.
  - o **Encouraging higher fertility rates in these regions**, which already struggle with poverty, inadequate healthcare, and limited access to education, **risks worsening existing inequalities.**
  - o **A population boom in such areas** would likely exacerbate unemployment and strain public services, **further entrenching cycles of poverty and underdevelopment.**
- **Regional Disparities in Fertility Trends**
  - o **Southern states** like Kerala, Tamil Nadu, and Karnataka **have already achieved fertility rates well below the replacement level of 2.1 children per woman.**
  - o **These states are unlikely to reverse their demographic transition**, as lower fertility rates are typically driven by factors such as higher levels of education, improved healthcare, and urbanization.
  - o **Conversely, the northern states, which continue to have higher fertility rates, are more likely to respond to policies that emphasise better healthcare** and education rather than slogans promoting increased birth rates.
- **Underestimation of Social and Cultural Realities**
  - o Proposals advocating for higher fertility **also underestimate the role of societal factors in reproductive decisions.**
  - o **Couples typically base family size on practical considerations such as financial stability,** access to childcare, and aspirations for a better quality of life for their children.
  - o **In modern India, where aspirations for upward mobility and better living standards dominate, political exhortations are unlikely to influence reproductive behaviour**

- **Regional Disparities and Political Concerns**
  - o **Southern states with lower fertility rates fear losing political representation** and federal funding due to their declining population share.
  - o **This apprehension has led some leaders to advocate for higher fertility in the South,** however, **adopting competitive population growth strategies is not the solution.**
  - o Instead, **southern states should advocate for reforms in funding allocation and political representation criteria** that prioritise administrative efficiency over population size.
  - o **While the concerns about labour shortages and ageing populations** in the South are **valid, they are not insurmountable.**
  - o **Fertility rates in many states remain above replacement levels,** and regional labour shortages can be mitigated through enhanced mobility and migration policies.
- **Economic Risks of Overemphasizing Population Growth**
  - o **Encouraging higher fertility rates** without corresponding economic and infrastructural support **could have dire consequences.**
  - o **Increased population growth would place additional demands on education, healthcare, and housing systems**, potentially negating economic gains.
  - o For example, **the rise in population in poorer regions could lead to a larger unskilled workforce**, further flooding the informal sector and driving down wages.

Labour Market Challenges and Historical Lessons in Labour Management
- **Labour Market Challenges**
  - o The **country's female work participation rate remains alarmingly low** compared to other developing nations, despite recent improvements.
  - o A **demographic transition offers an opportunity to empower women** through skill development and increased participation in the formal economy.
  - o Moreover, **India's vast reservoir of semi-employed workers in low-productivity sectors could transition to modern industries** with adequate policy support.
- **Historical Lessons in Labour Management**
  - o **History offers examples of countries successfully managing stable or declining populations** without resorting to fertility increases.
  - o **Nations like Germany and Singapore have navigated labour shortages by promoting international migration**, investing in skill development, and automating industries.
  - o **India, too, can address potential labour shortages through similar measures**, rather than through unsustainable population growth.
  - o **Simplifying migration policies, improving interstate mobility**, and ensuring better living and working conditions for workers **could help address regional labour mismatches.**

A Better Approach to Demographic Management
- **Investing in Healthcare and Education**
  - o **Improving maternal and child healthcare not only reduces mortality rates but also leads to healthier populations** capable of contributing productively to the economy.
  - o **Ensuring universal access to family planning services** and modern contraceptives is equally **vital in empowering couples to make informed reproductive choices.**
  - o There is a strong correlation between education, especially female education, and reduced fertility rates.
  - o **Education delays the age of marriage, improves knowledge** about family planning, **and increases women's participation in the workforce.**
  - o **Programs that focus on expanding access to education**, particularly in rural and underserved regions, can significantly stabilize fertility rates **while creating long-term economic growth.**
- **Encouraging Skill Development**

- o **India has a significant workforce trapped in low-productivity sectors**, such as subsistence agriculture and informal labour markets.
- o **By investing in vocational training and skill-building programs**, particularly in high-demand sectors like manufacturing, technology, and healthcare, **India can create a more productive workforce.**
- o **Initiatives such as Skill India and Digital India need to be scaled up** and better integrated with regional needs.
- **Enhancing Migration Policies**
  - o **This includes reducing documentation barriers, creating interstate labour registries**, and providing incentives for industries to employ migrant workers.
  - o **Ensuring proper housing, healthcare, and educational facilities for migrant workers** and their families can make migration a viable and attractive option.
  - o **States can also collaborate to create comprehensive welfare schemes for migrants,** reducing friction between sending and receiving regions.
- **Promoting Female Workforce Participation**
  - o **Enabling flexible work arrangements, extending maternity benefits, and ensuring workplace safety can encourage more women** to enter and remain in the workforce.
  - o **Special focus on skill development for women, particularly in technology** and other growth-oriented sectors, can expand their opportunities.
  - o **Facilitating access to credit and mentorship for female entrepreneurs can further empower women**

Conclusion

- **India's demographic transition is not an impending crisis but a challenge that requires strategic planning** and thoughtful policies.
- **Instead of resorting to simplistic calls for higher fertility, policymakers must address structural issues in labour mobility, gender empowerment**, and ageing support systems.
- **With a balanced and inclusive approach, India can transform demographic changes into opportunities** for sustainable development.

10. Is the Caste Census a Useful Exercise?

Introduction:

- The debate around conducting a caste census in India has gained momentum, with proponents arguing for its utility in determining caste populations to allocate resources, reservations, and policy benefits proportionally.
- However, historical experiences and current complexities suggest significant challenges in executing such an exercise.

Historical Context:

- **The history of caste censuses dates back to the colonial era:**
  - o **1871-72 Census**: The first detailed caste census was conducted, revealing arbitrary and inconsistent classifications across regions.
  - o **1931 Census**: Identified 4,147 castes but highlighted inaccuracies as communities claimed different identities in different regions.

Name of Caste	1921 Census claims	1931 Census claims
Kamar (Kumar)	Kshatriya	Brahman
Sonar	Kshatriya/Rajput	Brahman/Vaisya
Sutradar	Vaisya	Brahman
Nai	Thakur	Brahman
Napit	Baidya	Brahman
Rawani (Kahar)	Vaisya	Kshatriya

Note: The change in caste claim was not influenced by reservation policies or any other form of government benefits

- o **Post-Independence**: The **Socio-Economic and Caste Census (SECC) 2011** recorded 46.7 lakh caste categories, with 8.2 crore acknowledged errors, exposing the complexity of caste classification.

Challenges in Conducting a Caste Census:

- **Caste Mobility and Misclassification**:
  - o **Upward Mobility**: Communities might report affiliation with higher castes for perceived social prestige.
  - o **Downward Mobility**: Post-independence, some communities claim lower caste status to benefit from reservations.
  - o **Similar-Sounding Castes**: Confusion arises from identical or similar surnames, leading to misclassification (e.g., **'Dhanak', 'Dhanuk', and 'Dhanka' in Rajasthan).**
- **Enumerator Bias**:
  - o Sensitive nature of caste questions often causes enumerators to make assumptions based on surnames rather than direct inquiries.
- **Data Accuracy**:
  - o Historical records and current surveys, such as the **Bihar Caste Census 2022**, reveal inconsistencies, further undermining reliability.

Proportional Representation: A Flawed Approach

The concept of proportional representation in caste-based reservations has been criticized as impractical:

- o **Reservation Mechanism**:
  - ▪ **Reserved seats are distributed proportionally** (e.g., every 4th position for OBCs at 27% reservation).
- o **Impracticality**:
  - ▪ India's population of 1.4 billion includes over 6,000 castes. The average caste size is 2.3 lakh.
  - ▪ Smaller castes, such as those with 10,000 members, would require over 1.4 lakh vacancies to secure one reserved seat, a scale unfeasible in recruitment processes like UPSC.

Implications of a Caste Census:

- **Policy Implementation**:
  - o While proponents argue for equitable resource distribution, the data complexities risk exacerbating social divisions.
- **Exclusion of Minor Castes**:
  - o Smaller castes risk being excluded due to disproportionately low representation, undermining the objective of inclusivity.
- **Administrative Burden**:
  - o A caste census would require massive **logistical and financial resources**, diverting focus from other pressing developmental priorities.

Conclusion:

- While **the idea of a caste census is rooted in achieving equity, historical and contemporary evidence highlights significant challenges in execution, data reliability, and fairness**.
- Alternative approaches that prioritize socio-economic development and inclusivity without exacerbating caste divisions may offer more sustainable solutions.

11. What UK's assisted dying bill says, how it compares to Indian law

Why in news?

The **Terminally Ill Adults (End of Life) Bill** was **introduced in the UK to provide terminally ill patients with the option to seek assistance to end their lives.** The Bill addresses ethical and humanitarian concerns for patients with no hope of recovery, ensuring dignity in their final days.

The Bill was backed by a majority of 330 to 275, with 38 MPs not voting. The Bill will now be sent to a public bill committee which will vote on any proposed amendments before being voted on again in the House of Commons.

It will then be sent to the House of Lords, where further changes could be made, before a final vote is held.

Assisted Dying and debate around it

- **Definition**
  - **Assisted dying** generally refers to **a person who is terminally ill receiving lethal drugs from a medical practitioner, which they administer themselves.**
  - **Assisted suicide** is intentionally helping another person to end their life, including someone who is not terminally ill.
    - That could involve providing lethal medication or helping them travel to another jurisdiction to die.
  - **Euthanasia** is the **act of deliberately ending a person's life to relieve suffering in which a lethal drug is administered by a physician/doctor.**
    - Patients may not be terminally ill.
    - **There are two types: voluntary euthanasia, where a patient consents; and non-voluntary, where they cannot because, for example, they are in a coma.**
- **Arguments in Favor of Assisted Dying**
  - **Control and Dignity**: Allows terminally ill patients to choose a humane way to end their suffering.
  - **Limitations of End-of-Life Care**: Proponents argue that such care often fails to alleviate pain and symptoms effectively.
  - **Suicide Prevention**: A legal framework could deter impulsive suicides and prevent family members from being involved in illegal assistance.
- **Arguments Against Assisted Dying**
  - **Risk of Misuse**: Potential for coercion, especially among vulnerable groups like the elderly and disabled.
  - **Impact on Vulnerable Populations**: Detractors fear it could lead to undue pressure on patients to opt for assisted dying.
  - **Focus on Care Improvements**: Critics advocate for enhancing end-of-life care instead of legalizing assisted dying.

What is the current UK law on this issue?

- **Current UK Law**
  - **Both assisted dying and euthanasia are prohibited**. Assisted suicide is a punishable offence with up to 14 years in prison.
- **History of Assisted Dying Bills in the UK**
  - Since 2013, at least three bills have been introduced to legalize assisted dying.
  - The debate remains polarised, reflecting deep ethical and social concerns.

What is the procedure provided in the bill?

- **Eligibility Criteria for Assisted Dying**
  - **Age and Residency**: Patient must be 18 or older, mentally capable, and residing in England or Wales for at least 12 months.
  - **Terminal Illness Definition**: The illness must be irreversible, worsening, and likely to cause death within six months.
  - **Exclusions**: Persons with disabilities or mental disorders are explicitly excluded.
- **Initial Request and Assessment Process**
  - **First Declaration**:
    - Patient signs in the presence of a coordinating doctor and a witness.
    - Coordinating doctor conducts a first assessment to confirm eligibility and voluntariness.
  - **Independent Assessment**:
    - Request is referred to an independent doctor for verification after a minimum seven-day reflection period.
    - Disagreements between doctors may lead to a referral to another independent doctor (only once).
- **Judicial Review**
  - If both doctors approve, the request is sent to the High Court of Justice for verification of compliance.

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- o High Court may question the patient and doctors.
- o Rejections can be challenged in the Court of Appeal.
- **Final Confirmation and Administration**
  - o **Second Period of Reflection**:
    - A 14-day waiting period follows High Court or Court of Appeal approval.
    - Patient signs a second declaration, witnessed by the coordinating doctor, the independent doctor, and a third person.
  - o **Self-Administration**:
    - Approved substance is provided to the patient by the coordinating doctor or designated practitioner.
    - Patient must self-administer the substance; the doctor is prohibited from administering it.

How does it compare to the law in India?

- **Supreme Court of India's Recognition of Passive Euthanasia**
  - o In Common Cause v. Union of India (2018), the Supreme Court ruled that the "**right to die with dignity**" is part of the fundamental right to life under Article 21 of the Indian Constitution.
  - o Legality of **passive euthanasia** was established, allowing withdrawal of life support for terminally ill patients or those in a permanent vegetative state.
    - Passive euthanasia enables natural death without medical interventions, differing from assisted dying.

Guidelines for Passive Euthanasia

- o **Living Will or Advance Medical Directive**
  - Patients can leave directives for withdrawal of life support.
  - Must be signed in the presence of two witnesses and a Judicial Magistrate.
- o **Approval Process**
  - Requires consent from the treating physician, a medical board, and an external medical board with local administration representation.
- **Challenges and Modifications**
  - o In 2019, the Indian Society of Critical Care Medicine sought changes, terming the guidelines cumbersome and impractical.
  - o In 2023, the Supreme Court modified the guidelines to introduce strict timelines and reduce the involvement of the Judicial Magistrate.
  - o Awareness and implementation of these guidelines remain limited across India.
- **Draft Guidelines by Ministry of Health (2024)**
  - o In August 2024, the Ministry of Health and Family Welfare issued draft guidelines similar to the Supreme Court's recommendations.

12. Road Accident Fatalities in India

Why in the News?

India continues to grapple with a severe road safety crisis, with Union Minister of Road Transport and Highways, **Nitin Gadkari**, revealing distressing figures for 2023.

Speaking at a road safety event in Lucknow, Gadkari highlighted the **magnitude of road accidents**, their causes, and ongoing efforts to mitigate this critical issue.

Road Accident Statistics for 2023:

- **Total Crashes**: Over **4.80 lakh road accidents** occurred in 2023, marking a **4.2% increase** compared to 2022.
- **Fatalities**: Over **1.72 lakh deaths** were reported, a **2.6% rise** from 2022's 1.68 lakh fatalities.
- **Daily Impact**:
  - o **1,317 crashes** and **474 deaths** occurred daily in 2023, translating to **55 crashes** and **20 fatalities** every hour.

- **Crash Severity**: Fatalities per 100 crashes marginally decreased from **36.5 in 2022** to **36 in 2023**.

Key Causes for Road Accidents:
- **Human Behaviour**:
  - The Minister emphasized that **human error** is the leading cause of accidents, driven by **disregard for laws** and unsafe practices like over-speeding and reckless driving.
  - **Over-speeding** accounted for **68.1%** of road crash deaths in 2023.
- **Helmet and Seatbelt Non-Usage**:
  - **54,000 deaths** were attributed to not wearing helmets.
  - **16,000 fatalities** occurred due to seatbelt non-compliance.
- **Pedestrian and Two-Wheeler Vulnerability**:
  - Pedestrians accounted for **20%** of road crash fatalities.
  - Two-wheeler users made up **44.8%** of fatalities.
- **Infrastructure Deficiencies**:
  - Gadkari acknowledged the presence of **potholes**, lack of **underpasses**, and insufficient **foot overbridges**, which significantly contribute to accidents.
  - **Black spots** (high-risk areas) on national highways are being addressed with a **₹40,000 crore budget** for rectification.
- **Other Factors**:
  - **Overloaded vehicles**: Accounted for **12,000 deaths**.
  - **Unlicensed driving**: Contributed to **34,000 crashes**.
  - **Old vehicles and outdated technology**: Further exacerbated risks.

Regional Disparities:
- **Uttar Pradesh (UP)**:
  - UP recorded the **highest number of road accidents and fatalities** in India, with **44,000 accidents** and **23,650 deaths** in 2023.
- **Notable figures:**
  - **1,800 deaths** were of individuals below 18 years.
  - **10,000 fatalities** involved pedestrians and two-wheeler users.
  - **8,726 deaths** were caused by over-speeding.

Government Initiatives:
- **Infrastructure Improvements**:
  - Identifying and addressing black spots on highways.
  - Enhancing road designs and adding safety measures like underpasses and foot overbridges.
- **Automobile Engineering**:
  - Directives to improve vehicle safety features to reduce fatalities.
- **Awareness Campaigns**:
  - Promoting road safety through public awareness initiatives.
  - Advocating for states to include **Rules of the Road** in school curriculums.
- **Ambitious Goals**:
  - Despite aiming to reduce accidents by 50% by 2024, the progress remains insufficient, indicating the need for intensified efforts.

Global Context & Learnings:
- India's road safety challenges are among the most severe globally.
- According to the **World Bank**, **poor road infrastructure, coupled with rapid urbanization** and increasing vehicular traffic, exacerbates the problem.

- Countries like **Sweden** and the **Netherlands** have successfully implemented the **Vision Zero initiative**, targeting zero road fatalities through stringent policies and advanced road designs.
- India can adopt similar approaches to create safer roads.

General Studies II

1. Challenges of Holding Judges Accountable in India

Introduction:
- The accountability of judges in India, particularly in the higher judiciary, remains a contentious issue due to the complex mechanisms and significant immunity granted to them.
- Recent events, such as **controversial remarks by Justice Shekhar Kumar Yadav of the Allahabad High Court**, have reignited the debate on judicial accountability and the difficulties in addressing judicial misconduct effectively.

Accountability Mechanism for Judges:
- **Legal Framework**:
  o The process for holding judges accountable is governed by the **Judges (Inquiry) Act, 1968**, supported by Articles **124(4)**, **124(5)**, **217**, and **218** of the Indian Constitution.
- **Review Process**:
  o A judge can only be removed based on "**proved misbehaviour or incapacity**" as determined by a **three-member committee** comprising:
    ▪ A Supreme Court judge
    ▪ A Chief Justice of a High Court
    ▪ An eminent jurist
- **Impeachment Process**:
  o Initiation of impeachment requires a motion in either the Lok Sabha or Rajya Sabha, approved by the respective presiding officer.
  o Removal demands a **two-thirds majority** of members present and voting in both Houses of Parliament.

Case Studies Highlighting the Challenges:
- **Justice V. Ramaswamy (Supreme Court Judge)**
  o **Allegations**: Accused of **financial impropriety**, such as extravagant spending on his official residence and misusing public funds.
  o **Outcome**:
    ▪ A committee found him guilty, leading to the Chief Justice of India deciding not to allocate any work to him.
    ▪ Despite this, the **impeachment motion in the Lok Sabha failed in 1993 due to abstentions by the ruling Congress Party.**
    ▪ Justice Ramaswamy continued in office and retired with full benefits, highlighting the inadequacy of the impeachment process.
- **Justice Soumitra Sen (Calcutta High Court Judge)**
  o **Allegations**: Misappropriation of ₹33.23 lakh as a court-appointed receiver and misrepresentation of facts.
  o **Outcome**:
    ▪ Found guilty by a three-member committee.
    ▪ Rajya Sabha voted for his removal, but he resigned before the motion could be tabled in the Lok Sabha.
    ▪ His resignation underscored the challenge of ensuring accountability once a judge steps down.
- **Justice P.D. Dinakaran (Sikkim High Court Chief Justice)**
  o **Allegations**: Accused of **land grabbing and other serious misconduct**.
  o **Outcome**:
    ▪ Resigned on the day the three-member committee was to begin its proceedings.
    ▪ His resignation effectively halted the investigation and highlighted the loophole wherein resignation can abort accountability mechanisms.

Need for Reforms:

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- **Continue Investigations Post-Resignation**:
  - o **Resignation should not end an investigation,** as it allows accused judges to evade accountability.
  - o Legal reforms must ensure the **continuation of proceedings to establish guilt or innocence**, irrespective of resignation.
- **Independent Oversight**:
  - o Establish a more robust framework to investigate allegations without requiring parliamentary approval at the initial stages.
- **Revisiting the Judges (Inquiry) Act**:
  - o Amendments are needed to address procedural delays and reduce political interference in impeachment motions.

Conclusion:
- The current framework for holding judges accountable in India is inadequate to address instances of judicial misconduct effectively.
- **High levels of immunity**, coupled with **procedural delays and loopholes**, undermine public confidence in the judiciary.
- Strengthening the legal mechanisms and ensuring continuity in accountability processes are essential to uphold judicial integrity and maintain trust in the rule of law.

2. Navigating India's Complex Foreign Policy Challenges

Context:
After Prime Minister Modi's third term began in June, 2024 saw intense diplomatic activity amidst global insecurity and regional shocks, especially in Bangladesh.
With 2025 likely to be even more unpredictable, India's foreign policy must stay adaptable to change.

Key highlights of India's external relations
- **Key Developments in India-China Relations**
  - o The most challenging negotiation of 2024 was the **disengagement at the Line of Actual Control with China**.
  - o The **first Modi-Xi Jinping meeting in five years, held at Kazan during the BRICS summit in Russia**, marked a significant step towards rebuilding trust after PLA transgressions since 2020.
- **Strengthening Strategic Ties with France**
  - o **French President Emmanuel Macron attended Republic Day as the chief guest**, solidifying India-France cooperation in defence, energy, and maritime sectors.
  - o While India aimed to host U.S. President Biden and the Quad summit, Macron's visit reinforced bilateral dependability.
- **Progress on Trade Agreements**
  - o The conclusion of the **India-European Free Trade Association agreement early in 2024** was a milestone, serving as a template for future FTAs.
  - o However, no substantial progress was made on agreements with Australia, the U.K., or the EU by year-end.
- **Diplomatic Engagements in the Neighborhood**
  - o India hosted leaders from most neighboring countries during PM Modi's swearing-in, except Pakistan.
  - o Notable highlights included Bhutan's leadership visits, **PM Modi's trip to Thimphu, and successful diplomatic exchanges with Sri Lanka and Maldives, mending earlier tensions.**

Challenges that preoccupied South Block in 2024
- **Estranged Relations with Bangladesh**
  - o The **ousting of Prime Minister Sheikh Hasina in August** marked a significant setback for India-Bangladesh ties.
  - o **Rising attacks on Hindu minorities** and Ms. Hasina's stay in India further strained the once-strong partnership.

- **Worsening Ties with Canada**
  - Relations with Canada deteriorated after allegations of **Indian involvement in the Nijjar killing**, with even Home Minister Amit Shah being named.
  - India retaliated by freezing diplomatic ties with PM Justin Trudeau's government, awaiting potential change in 2025.
- **Legal and Diplomatic Challenges with the U.S.**
  - Tensions with U.S. escalated due to **indictments against the Adani group and an Indian official linked to the alleged Pannun assassination plot.**
  - However, the election of U.S. President Donald Trump and his pro-India administration offers a glimmer of hope.
- **Regional Rivalries and China's Influence**
  - The U.S.'s involvement in South Asia, changes in Bangladesh, and China's growing influence in Nepal and neighboring countries remain persistent challenges for India's foreign policy.

How did Indian foreign policy navigate global conflict?
- **Balancing Act in Global Conflicts**
  - India maintained a **neutral stance, advocating for peace amidst the Russia-Ukraine conflict** and Israel's war in Gaza.
  - PM Modi's visits to Russia and Ukraine sparked speculation about a potential mediatory role.
  - Despite meeting **Palestinian PM Mahmoud Abbas at the UN and condemning civilian casualties, India avoided explicitly holding Israel accountable at the UN.**
- **Shifting Focus in West Asia**
  - With multilateral initiatives like IMEC and I2U2 facing challenges, India pivoted to bilateral engagements with West Asian nations.
  - In 2025, navigating tensions between Iran and the Israel-U.S. alliance will be a key challenge for Indian diplomacy.

India's diplomatic agenda for 2025
- **Strengthening U.S.-India Relations**
  - External Affairs Minister Jaishankar's meetings with the Trump transition team signal a U.S. focus for 2025.
  - Key events include **President Trump's visit for the Quad Summit and PM Modi's potential trip to Washington beforehand.**
- **Engagement with Iran and iCET Discussions**
  - India will host a ministerial visit from Iran early in 2025, followed by U.S. NSA Jake Sullivan's visit for a crucial iCET (Initiative on Critical and Emerging Technology) meeting.
- **High-Profile Diplomatic Visits**
  - Indonesian President Prabowo Subianto will be the Republic Day guest, and Russian President Vladimir Putin's first visit to Delhi since the war began is expected to be finalized.

3. India's Reliance on China for Critical Minerals: Challenges and Opportunities

Overview:
- In 2023, the Ministry of Mines identified **30 critical minerals essential for India's economic development and national security.**
- The report highlighted a complete import dependency for 10 critical minerals but fell short of addressing India's reliance on China—a dominant player in the global critical minerals ecosystem.
- This reliance raises strategic vulnerabilities and the need for alternative strategies.

What are Critical Minerals?

- Critical minerals are raw materials essential for economic and national security, often used in **high-tech industries** and **renewable energy technologies**.
- They are **typically rare, difficult to mine and substitute**, and often vulnerable to supply chain disruptions due to limited global production and geopolitical factors.
- The growing demand for these minerals, driven by **technological advancements and the global transition to green energy, underscores their critical importance.**
- Securing a stable supply of critical minerals is thus a strategic priority for many countries to ensure economic stability and technological progress.

China's Dominance in Critical Minerals:
- **Vast Resources**: China has discovered **173 types of minerals, including:**
  - 13 energy minerals
  - 59 metallic minerals
  - 95 non-metallic minerals
- **Strategic Investments**: With $19.4 billion invested in exploration in 2023, China discovered 132 new mineral deposits, including 34 large ones.
- **Processing Capabilities**: Dominates processing and refining:
  - **Rare earths:** 87%
  - **Lithium:** 58%
  - **Silicon:** 68%
- **Global Investments**: Strategic stakes in overseas mining projects amplify its control over supply chains.

China's Export Strategy:
- China strategically controls critical mineral exports, particularly targeting those crucial for semiconductors, batteries, and high-tech manufacturing. Key examples include:
  - **2010 Rare Earth Embargo**: Against Japan
  - **Restrictions on Gallium, Germanium, and Antimony**: Recent targeted actions
  - **Ban on Rare Earth Technologies (2023)**: To protect domestic interests
- **China avoids actions that might:**
  - Disrupt its export-dependent industries
  - Undermine its reliance on Western-imported raw materials

India's Dependency on China:
- India's import data (2019-2024) reveals high dependency on Chinese supplies for six critical minerals:
  - **Bismuth (85.6%)**: Vital for pharmaceuticals and chemicals
  - **Lithium (82%)**: Core to EV batteries and energy storage
  - **Silicon (76%)**: Crucial for semiconductors and solar panels
  - **Titanium (50.6%)**: Key for aerospace and defense
  - **Tellurium (48.8%)**: Used in solar and thermoelectric devices
  - **Graphite (42.4%)**: Indispensable for EV batteries and steel production
- China's dominant global production shares in these minerals underscore India's supply chain vulnerabilities.

Why India Relies on Imports?
Despite abundant mineral resources, structural challenges hinder India's mining and processing ecosystem:
- **Technological Barriers**:
  - Limited ability to extract minerals like **lithium from clay deposits in Jammu & Kashmir, despite having 5.9 million tonnes of resources.**
- **Investment Gaps**:
  - High-risk investments in exploration deter private sector participation.

- o **Policy Shortcomings**:
  - Lack of incentives and advanced mining technologies limit domestic production capabilities.

Strategic Way Forward:
- **Securing Overseas Assets**:
  - o The government established **KABIL** (Khanij Bidesh India Limited) to acquire overseas mineral resources.
- **International Collaborations**:
  - o Partnerships through the **Minerals Security Partnership** and **Critical Raw Materials Club** aim to diversify supply sources.
- **Research and Development**:
  - o Institutions like the **Geological Survey of India** and **CSIR** are advancing technologies for exploration and processing.
- **Promoting Recycling**:
  - o Circular economy initiatives and production-linked incentives focus on recycling critical minerals to reduce dependency.
- **Policy Reforms**:
  - o Introducing incentives to attract private investment and updating mining regulations to encourage domestic exploration.

Conclusion:
- India's transition from dependence on China requires **sustained investment, technological advancements, and global partnerships.**
- While government initiatives show promise, long-term commitment and proactive policies will be critical for securing a self-reliant future in critical minerals.

4. Fourth branch institutions shouldn't be retirement homes for civil servants, judges

Why in news?
While delivering a speech, Supreme Court judge **Justice P S Narasimha said that fourth branch institutions should not be retirement homes for civil servants and judges.**
Justice Narasimha was delivering the second edition of the Justice ES Venkataramiah Centennial Memorial Lecture organised by National Law School of India University in Bengaluru.

Fourth Branch Institutions in India
- **About**
  - o Fourth branch institutions refer to **constitutionally or statutorily created bodies that function independently of the executive, legislature, and judiciary to uphold accountability, transparency, and democracy**.
  - o These institutions act as **watchdogs**, ensuring that power is not concentrated in any single branch of government.
  - o E.g., the **Election Commission of India (ECI), Comptroller and Auditor General (CAG), Central Information Commission (CIC), and Central Vigilance Commission (CVC) etc.**
- **Significance**
  - o The ECI **ensures free and fair elections, bolstering democracy**.
  - o Similarly, the CAG's audit of the 2G spectrum allocation and coal block allocation exposed large-scale irregularities, spurring public debate on corruption.
- **Concerns**
  - o Allegations of partisanship against the ECI during certain elections, such as **delayed action on violations of the Model Code of Conduct, raise concerns about its autonomy.**
  - o The CAG, too, has faced criticism for **delays in audits and alleged overestimation of losses.**

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- o Furthermore, institutions like the CIC suffer from vacancies and delays in hearing appeals, reducing their effectiveness.
- **Conclusion**
  - o Strengthening these institutions is crucial to safeguard democracy.
  - o Ensuring independence through **transparent appointment processes, sufficient funding, and protection from political interference is vital.**
  - o Stronger fourth branch institutions will enhance governance, restore public trust, and ensure accountability in a rapidly evolving democratic landscape.

Key Highlights of Justice P S Narasimha's Speech

- **Significance of Fourth Branch Institutions**
  - o Justice Narasimha emphasized the critical role of fourth branch institutions such as **the EC, CAG, Public Service Commissions, and National Commissions for SCs, STs, and OBCs.**
  - o He underlined their importance in ensuring accountability and governance, as envisioned by the Constitution's framers.
- **Challenges Facing Fourth Branch Institutions**
  - o **Domain Expertise and Capacity Building**: Justice Narasimha pointed out that domain expertise and institutional capacity are often neglected.
  - o **Diversity in Composition**: He highlighted the lack of diversity in these institutions' composition.
  - o **Avoiding Retirement Homes**: Justice Narasimha cautioned against turning these bodies into retirement homes for civil servants and judges, advocating for merit-based appointments.
- **Election Commission's Independence**
  - o He lauded the foresight of the Constitution's framers in creating the Election Commission as an independent body, free from executive control, to ensure fair and impartial elections.

5. Crimes Against Humanity and an Obtuse Indian Stance

Context

- Recently, the United Nations General Assembly **(UNGA) adopted a resolution approving the text** of a **proposed treaty for the prevention and punishment of crimes against humanity (CAH).**
- The **journey to this point began in 2019** when the International Law Commission submitted the draft text to the Sixth Committee of the UNGA.
- This **development addresses a crucial gap in international criminal law and lays the foundation for a robust legal framework** to prevent and punish CAH globally.

An Analysis of the Accountability Gap in International Law

- **Lack of a Legal Framework**
  - o Crimes against humanity (CAH) are among the most egregious violations of international law, **yet the legal framework governing them lacks the comprehensiveness and clarity** afforded to other international crimes like genocide and war crimes.
  - o This gap **stems from the absence of a dedicated treaty specifically addressing CAH,** unlike the Genocide Convention of 1948 and the Geneva Conventions of 1949, which provide clear mandates and obligations for preventing and prosecuting these crimes.
  - o **CAH, despite being codified in the Rome Statute** of the International Criminal Court (ICC), **suffer from limitations in enforcement and scope.**
    - ▪ **The Rome Statute, adopted in 1998**, is the **treaty that established the ICC to prosecute individuals for genocide, war crimes**, crimes against humanity, and aggression.
    - ▪ It **aims to ensure accountability for serious international crimes** and promote global justice.
- **The Jurisdictional Challenge of the ICC**

- One of the primary accountability challenges lies in the **ICC's limited jurisdiction.**
- As a treaty-based institution, **the ICC can only exercise jurisdiction over crimes committed on the territory of its member states** or by their nationals, unless the United Nations Security Council refers a case to it.
- This **limitation excludes a significant number of states**, including major global players, from the ICC's reach
- **It creates a jurisdictional void** where perpetrators in non-member states can evade justice.
- **Without a dedicated treaty** obligating broader state cooperation, **many CAH cases remain unaddressed.**

- **Individual Versus State Accountability**
  - Another issue is the **Rome Statute's focus on individual criminal responsibility,** which, while vital, does not account for state accountability.
  - **Genocide and war crimes treaties create state obligations to prevent and punish these crimes,** enabling legal actions at the state level.
  - For example, **The Gambia's 2019 case against Myanmar** at the International Court of Justice (ICJ) was made possible because the **Genocide Convention includes provisions for state responsibility.**
  - **A CAH treaty could similarly empower states and international bodies to hold governments accountable** for failing to prevent CAH, reinforcing the principle that states share responsibility for safeguarding human rights.

India's Position on the CAH Treaty

- **A Cautious Approach**
  - **India's stance on the proposed CAH treaty reflects a cautious and calculated approach,** rooted in its broader concerns about international criminal justice mechanisms.
  - **As a non-signatory to the Rome Statute** of the ICC, **India has consistently expressed reservations about the ICC's jurisdiction**, the powers of its prosecutor, and the role of the United Nations Security Council (UNSC) in its framework.
  - **These concerns shape India's scepticism toward a CAH treaty**, even as the international community advances efforts to address the gaps in prosecuting such grave crimes.

- **Scepticism Toward the ICC Framework**
  - **India's primary critique of the ICC** lies in its perceived **infringement on national sovereignty.**
  - **The ICC, through its jurisdiction, can investigate and prosecute individuals** from states that are not party to the Rome Statute if authorised by the UNSC.
  - **India views this provision as a potential overreach,** particularly when the UNSC's influence is often shaped by geopolitical considerations.
  - Additionally, **India has expressed concerns about the prosecutor's discretionary powers,** which it argues could lead to selective justice or politically motivated investigations.
  - **These reservations inform India's apprehension that a CAH treaty might inadvertently extend the ICC's influence** or create overlapping jurisdictions that undermine state sovereignty.

- **Disagreements on the Definition and Scope of CAH**
  - India's position on CAH is also influenced by its **divergence from the existing definitions and scope proposed in international forums.**
  - While the **Rome Statute includes crimes such as enforced disappearance, India opposes its inclusion in the CAH framework**, arguing that it is not universally applicable or adequately defined.
  - Conversely, **India has strongly advocated for the inclusion of terrorism as a crime against humanity,** emphasising its global threat and the necessity for international recognition of its severity.
  - **India has also criticised the exclusion of nuclear weapons and other weapons of mass destruction from the definition of war crimes under the Rome Statute,** further fuelling its scepticism about the comprehensiveness of the proposed treaty.

- **Preference for National Jurisdiction**
  - India's resistance to joining international treaties like the Rome Statute is rooted in its belief that **national legislations and judicial systems are better suited to address crimes against humanity and other international crimes**.

- o At the UN General Assembly, I**ndia has consistently emphasised the primacy of domestic jurisdiction, arguing that local courts,** being more attuned to the specific social and political contexts, are **better equipped to ensure justice.**
- o However, **this argument reveals a contradiction: India lacks comprehensive domestic legislation addressing international crimes, including CAH,** leaving a critical gap in its legal framework.
- **Calls for Further Deliberation**
  - o For the past five years, **India has advocated for an in-depth study and thorough discussions on the need for a CAH treaty.**
  - o It has argued that **duplicating the regime established under the Rome Statute could lead to inefficiencies** and redundancies.
  - o **India's stance reflects a broader caution** about the potential proliferation of international legal mechanisms that may overlap or conflict with existing frameworks.
  - o However, **this call for deliberation could also be interpreted as a delay tactic, given India's longstanding reservations about international criminal justice frameworks.**

The Way Forward for India
- To align its stated preference for national jurisdiction with its international obligations, **India must prioritise the incorporation of CAH and other international crimes into its domestic legal framework.**
- **This move would not only address the current legal lacuna but also strengthen India's credibility** on the global stage.
- Moreover, **by actively engaging in negotiations on the CAH treaty, India could advocate for the inclusion of issues it deems critical**, such as terrorism and nuclear weapons, while shaping the treaty to reflect its interests and concerns.
- **Taking a proactive role in the CAH treaty process would allow India to reaffirm its commitment to justice and human rights**, positioning itself as a leader in the fight against impunity for grave international crimes.

Conclusion
- **The adoption of the resolution for a CAH treaty is a landmark step in the international community's efforts** to combat impunity for crimes against humanity.
- **While India's reservations reflect legitimate concerns,** its lack of domestic legislation addressing international crimes undermines its position.
- **By enacting comprehensive laws against CAH, India can not only address this inconsistency but also lead the way in the global quest for justice**, embodying the role of a true global leader.

6. Protected Area Regime reimposed in Manipur, Nagaland and Mizoram

Why in news?
The Union Ministry of Home Affairs has reinstated the **Protected Area Permit (PAP) in Manipur, Nagaland, and Mizoram** due to security concerns stemming from the influx of individuals from neighboring countries. The move ensures that foreigners visiting these states must secure the necessary PAP under the Foreigners (Protected Areas) Order, 1958.

Protected Area Permit (PAP)
- **About**
  - o PAP is a **special permit required by foreign nationals to visit certain areas in India deemed sensitive due to their proximity to international borders.**
  - o These areas fall between the "Inner Line" and the international borders as defined under the **Foreigners (Protected Areas) Order, 1958**.
- **Covered Area**

- o The PAP regime covers entire or parts of states such as **Arunachal Pradesh, Manipur, Mizoram, Nagaland, Sikkim, Himachal Pradesh, Jammu & Kashmir, Rajasthan, and Uttarakhand**.
- **Purpose of the Protected Area Permit**
  - o **National Security:** To regulate the entry of foreigners in sensitive areas near international borders.
  - o **Preservation of Local Communities:** To protect indigenous populations and their unique cultural heritage.
  - o **Environmental Conservation:** To minimize ecological disturbances in fragile regions.
- **Relevant Acts and Regulations**
  - o **Foreigners (Protected Areas) Order, 1958** – Defines areas as protected and prescribes the requirement for obtaining PAP.
  - o **Foreigners (Restricted Areas) Order, 1963** – Specifies Restricted Areas (such as Andaman & Nicobar Islands and parts of Sikkim) requiring a Restricted Area Permit (RAP).
- **Key Features of the PAP Regime**
  - o **Eligibility:** Foreigners, except Bhutanese citizens, need a PAP to enter and stay in these regions.
  - o **Permissible Visits**
    - ▪ Group tourists (minimum of two persons).
    - ▪ Restricted tourist circuits/routes specified in the permit.
  - o **Validity and Compliance**
    - ▪ PAP is valid only for the specified area, route, and time.
    - ▪ Permit holders cannot stay beyond the permit's validity.
    - ▪ Photocopies of the permit must be deposited at entry and exit points.
  - o **Restrictions**
    - ▪ Citizens of Afghanistan, China, and Pakistan (and those of Pakistani origin) require prior approval from the Ministry of Home Affairs (MHA).
    - ▪ Diplomats and officials require special instructions from the Ministry of External Affairs.
  - o **Registration**
    - ▪ Foreigners must register with the Foreigners Registration Officer (FRO) of the district within 24 hours of arrival.

Protected Area Regime reimposed in Manipur, Nagaland and Mizoram
- **About the news**
  - o The Union Ministry of Home Affairs has reinstated the **Protected Area Permit (PAP) regime in Manipur, Mizoram, and Nagaland due to growing security concerns caused by the influx from neighboring countries.**
  - o Under the Foreigners (Protected Areas) Order, 1958, foreign nationals visiting these states must obtain PAP for entry.
  - o With the reimposition of the PAP, the movement of foreigners in Manipur will be closely monitored, strengthening border security and preventing unauthorized entries.
- **Historical Context**
  - o The **PAP regime was lifted from Manipur, Mizoram, and Nagaland in January 2011 to promote tourism**.
  - o However, the current security situation necessitated its reimposition.
  - o The permit typically allows foreign nationals to stay for 10 days, with an option for extension, and can be issued by the Union Home Ministry or concerned state authorities.

7. In Today's India, Can the Constitution Protect Individual Dignity?

Context
- **The parliamentary debate on the Constitution often descends into a partisan contest** between political parties, with each accusing the other of undermining constitutional values.
- While such debates ostensibly reflect democratic accountability, **they often fail to inspire confidence in the preservation of these values.**

- Amid these debates, **it is important to explore the core principles of modern Indian constitution, its challenges and paradoxes, and the future actions** to navigate these challenges and paradoxes.

Core Principles of Modern Constitutionalism

- **Protection of Individual Rights**
  - The cornerstone of constitutionalism is the **safeguarding of individual freedoms and dignity.**
  - The **Constitution enshrines fundamental rights that ensure every citizen's freedom of speech, expression, religion,** and association, among others.
  - These **rights serve as a bulwark against oppression and discrimination,** empowering individuals to lead lives of autonomy and self-respect.
  - The **framers of modern constitutions understood that preserving these freedoms was essential** to human dignity and societal progress.

- **Equality Before the Law**
  - **Political and legal equality are central tenets** of constitutionalism.
  - The **principle of equality ensures that all citizens, regardless of caste, creed, gender, or economic status, are entitled to equal protection** under the law.
  - This **equality is fundamental to developing an inclusive society** where every individual can participate in public life without fear of prejudice or exclusion.

- **Checks and Balances**
  - **Constitutionalism emphasises the separation of powers** among the executive, legislative, and judicial branches of government.
  - This **division ensures that no single entity wields unchecked authority,** creating a system of mutual oversight.
  - **Institutional checks and balances are designed to prevent the concentration of power,** promoting accountability and transparency in governance.

- **Limitation of Government Power**
  - Another core principle is the **formal limitation of government authority through clearly defined laws and procedures.**
  - **Constitutional frameworks describe the scope of government functions,** ensuring that power is exercised within the bounds of legality and reason.
  - These **limitations are vital to preventing authoritarianism** and preserving the democratic ethos.

- **Promotion of Political Agency**
  - Modern constitutionalism **envisions a society where citizens actively participate in shaping their collective destiny.**
  - **By guaranteeing universal suffrage and free elections, the Constitution empowers individuals to act as political agents** with the ability to influence governance.
  - **Political agency is further reinforced through mechanisms for public accountability,** such as free speech and a free press, enabling citizens to challenge decisions that affect their lives.

- **Commitment to Democracy**
  - At its heart, **constitutionalism is a commitment to democratic governance**, where collective decisions are made through deliberation and consent.
  - **The Constitution establishes the rules and processes through which representatives are chosen,** laws are enacted, and disputes are resolved.
  - This **commitment ensures that governance remains responsive to the will of the people** while respecting the rule of law.

- **Inclusion and Justice**
  - **While modern constitutions abstract away from specific social forms**, they often incorporate provisions for justice and inclusion.
  - For instance, **the Indian Constitution acknowledges the historical injustices faced by marginalised communities** and provides mechanisms for affirmative action.

- o **This balance between universal principles and targeted interventions underscores the Constitution's commitment** to fairness and equity.
- **Creating Collective Decision-Making**
  - o Constitutionalism **emphasises the importance of political justification in public decision-making.**
  - o It **requires that decisions affecting common life be subjected to public reasoning** and scrutiny, ensuring legitimacy and fairness.
  - o This **principle reinforces the idea of governance as a collective endeavour** rather than a unilateral imposition.

Challenges to Constitutional Ideals

- **Tension Between Individual Rights and Group Rights**
  - o A central challenge in constitutional democracies is **reconciling individual freedoms with the recognition and accommodation of group identities.**
  - o The **Indian Constitution exemplifies this tension by granting fundamental rights to individuals while also acknowledging the historical injustices** faced by specific communities, particularly marginalised caste groups
  - o **Measures like caste-based reservations aim to promote social justice but have also sparked debates about fairness**, meritocracy, and the perpetuation of identity-based politics.
  - o **These policies, while necessary for inclusion, sometimes conflict with the constitutional ideal of equality,** raising concerns about creating new forms of exclusion.
- **Entrenchment of Identity-Based Politics**
  - o Modern constitutionalism **aspires to liberate individuals from fixed ascriptive identities, enabling them to act as autonomous political agents**.
  - o However, **in practice, political systems often exploit identity-based divisions** for electoral gains.
  - o The **Indian Constitution envisions a society free from permanent majorities or minorities.**
  - o Yet, **identity politics has entrenched divisions along religious, caste, and regional lines,** with majority groups asserting dominance and minority groups demanding constitutional recognition as distinct social forces.
- **Subversion of Checks and Balances**
  - o The **principle of institutional checks and balances is crucial** to preventing the concentration of power. However, in practice, these safeguards are often undermined.
  - o **Both at the central and state levels, governments have frequently attempted to consolidate power**, sidelining the legislature and judiciary.
  - o This **erosion of institutional autonomy weakens the accountability mechanisms** envisioned by the Constitution.
  - o While **the judiciary is a vital guardian of constitutional values, instances of judicial overreach, where courts venture into policy-making, blur the separation of powers.**
  - o This trend, while well-intentioned, risks undermining democratic processes.

The Puzzle of Constitutional Permanence

- A **critical paradox of constitutionalism lies in its relationship with time.**
- The **Basic Structure Doctrine,** which asserts the inviolability of certain constitutional principles, **effectively arrests the Constitution in a quasi-eternal framework.**
- While this doctrine safeguards core values, **it also raises questions about whether the Constitution becomes a matter of mere invocation rather than genuine adherence.**
- The **Basic Structure, like a secular Sanatan Dharma, acts as an immutable truth,** yet its practical significance depends on the sincerity with which political actors uphold it.
- Historically, **constitutions represented real social power**, serving as mechanisms to channel and balance competing forces.
- **In contrast, modern constitutions, including India's, operate as legal constructs detached from fixed social forms.**
- This **abstraction is both a strength and a challenge: it allows for adaptability but also risks alienation** from the societal realities it seeks to govern.

Way Forward: Navigating the Future of Constitutionalism
- The survival of constitutional democracy **depends on addressing these paradoxes.**
- The **Constitution must continue to function as a framework for individual freedom and collective governance,** resisting the pull of ascriptive identities and permanent majorities.
- **This requires vigilance against the forces that subvert constitutional ideals**, whether through executive overreach, identity-based discrimination, or economic inequalities.

Conclusion
- **The Indian Constitution is a remarkable testament to the vision of its framers,** who sought to create a framework that transcends partisan interests and ascriptive identities.
- **However, its enduring relevance depends on the collective commitment to uphold its principles** in the face of evolving societal challenges.
- **By addressing the paradoxes of modern constitutionalism,** between abstract ideals and practical realities, between permanence and adaptability, **India can ensure that its Constitution remains a living document, safeguarding freedom, equality, and dignity for all.**

8. Minority Rights in India

Introduction:
- Minority rights are a cornerstone of democratic governance, ensuring the **preservation of cultural, linguistic, and religious diversity.**
- Recognizing this, the Indian Constitution and international frameworks like the **United Nations' 1992 Declaration on Minority Rights aim to protect minority communities.**
- Franklin Roosevelt aptly noted, "No democracy can long survive which does not accept as fundamental to its very existence the recognition of the rights of minorities."

Historical Context:
- The concept of minority rights traces its origins to 19th-century European constitutional frameworks:
  - **Austria (1867)**: Recognized ethnic minorities' rights to preserve their languages and national identities.
  - **Hungary (1868)**: Legislated similar protections.
  - **Post-World War I Treaties**: Incorporated minority protection clauses in agreements with nations like **Poland** and **Czechoslovakia**.
- India incorporated these principles during its Constitution drafting process, emphasizing the preservation of diversity.

Provisions in the Indian Constitution:
- **Article 29**: Grants all citizens the right to conserve their distinct culture, language, or script.
  - **Significance**: Recognizes and protects diverse cultural identities, ensuring equality and dignity.
- **Article 30**: Empowers religious and linguistic minorities to establish and administer educational institutions.
  - **Judicial Interpretation**:
    - The Supreme Court views **Article 30 as integral to equality and non-discrimination.**
    - Recent judgments (e.g., **Aligarh Muslim University, 2024**) uphold the minority character of institutions of national importance.
- **Article 350 A**: Mandates primary education in one's mother tongue.
- **Article 350 B**: Provides for appointing a Special Officer for linguistic minorities.
- The Constitution also supports personal laws for various communities, exemplified by the customary laws of the Nagas.

Defining 'Minority':

- The term "minority" lacks a universal definition in the Constitution. However:
  - **Judicial Interpretation**: The Supreme Court, in cases like TMA Pai Foundation (2002), defines minorities at the state level. For example, Hindus are considered minorities in Punjab and north-eastern states.
  - **Indicia for Minority Institutions**:
    - Originator's intent to serve minority communities.
    - Operational factors like funding, infrastructure, and administration.

Judicial Safeguards:
- While minority institutions enjoy autonomy, they are not exempt from oversight:
  - **Maladministration Prohibition**: Governments can enforce regulations to maintain institutional standards.
  - **Fair Aid**: Article 30(2) prohibits discrimination against minority institutions when granting aid.

Rationale Behind Minority Rights:
- The preservation of diversity underpins these rights. Cultural identity thrives not in isolation but within an enabling environment. Thus:
  - **Individual vs. Group Rights**: Individual equality (Articles 14-18, 19, 25) is insufficient without group recognition.
  - **Judicial Observations**: Courts consistently emphasize the necessity of special protections for minorities to achieve substantive equality.

Significance in Contemporary India:
- **Constitutional Legacy**: Articles 25-30 symbolize India's commitment to pluralism.
- **Global Relevance**: Aligns with international principles, such as the Universal Declaration of Human Rights.

Conclusion:
- India's constitutional framework ensures a delicate balance between individual equality and group recognition.
- By safeguarding minority rights, the **Constitution strengthens the nation's democratic ethos, fostering an inclusive society that respects its rich diversity.**
- However, evolving socio-political dynamics call for continued vigilance and adaptation to uphold these principles effectively.

9. Judicial Ethics and Conduct

Why in News?
Justice Shekhar Kumar Yadav of the Allahabad High Court has faced widespread criticism for comments made during an event organised by the legal cell of the Vishwa Hindu Parishad.

Controversial Remarks and Backlash:
- **Key comments:**
  - Justice Yadav stated that the **country operates as per the wishes of the majority population in India**.
  - He made divisive remarks comparing values taught to children of different communities, emphasising the practice of animal slaughter.
  - Advocated for a Uniform Civil Code (**UCC**), asserting that Hindus revere women as goddesses, in contrast to practices like polygamy and triple talaq in another community.
- **Response from legal and civil bodies:**
  - **Supreme Court's reaction:** The SC noted the issue and **sought details from the Allahabad HC**, stating the matter is under consideration.
  - **Criticism from legal fraternity:**
    - All India Lawyers Union termed the comments as **leaning towards a "Hindutva Rashtra."**
    - Prashant Bhushan's Campaign for Judicial Accountability and Reforms alleged **violations of judicial ethics.**

- ▪ Kapil Sibal, President of the Supreme Court Bar Association, called for Justice Yadav's **impeachment**.

Judicial Ethics and Conduct:
- **Standards for judicial conduct:**
  - o **1985 UN Basic Principles on the Independence of the Judiciary:** These principles seek to bridge the gap between ideal judicial independence and real-world practices, ensuring that -
    - ▪ **Justice is upheld,**
    - ▪ **Human rights are preserved, and**
    - ▪ **The court acts without discrimination**.
  - o **Restatement of values of judicial life (1997):** It is a code of judicial ethics (comprising 16 points) adopted by the SC. It emphasises impartiality and behaviour that reaffirms public confidence in the judiciary.
  - o **Bangalore principles of judicial conduct (2002):**
    - ▪ The UN Economic and Social Council (**ECOSOC**) adopted a resolution to complement the 1985 UN Basic Principles.
    - ▪ **It requires judges to act with dignity, impartiality, and independence while respecting societal diversity.**
- **Alleged violations:** Justice Yadav's remarks and participation in a politically affiliated event appear to contravene these codes, undermining the judiciary's perceived neutrality.

The Impeachment Process for Judges:
- **Constitutional provisions:**
  - o A judge may be removed from office through a motion adopted by Parliament on grounds of **'proven misbehaviour or incapacity'.**
  - o While the Constitution does not use the word 'impeachment', it is commonly used to refer to the proceedings under **Article 124** (for the removal of a SC judge) and **Article 218** (for the removal of a HC judge).
  - o The Constitution provides that a judge can be **removed only by an order of the President**, based on a motion passed by both Houses of Parliament.
- **The procedure for removal of judges:**
  - o It is elaborated in **the Judges Inquiry Act, 1968**, which sets out the steps for removal from office.
  - o **Impeachment requires a special majority** (a majority of the total membership of that House; and a majority of at least two-thirds of the members of that House present and voting) **in Parliament.**
- **In-house procedure:** Established in 1999 and publicly released in 2014. Steps include:
  - o **Submission of a complaint to the President**, Chief Justice of India (CJI), or High Court Chief Justice.
  - o **Inquiry by a fact-finding committee** comprising senior judges if allegations are serious.
  - o **Recommendation** for voluntary retirement or escalation to impeachment if the judge refuses to step down.

Conclusion:
- Justice Shekhar Kumar Yadav's controversial remarks have r**eignited discussions on judicial accountability and ethics.**
- The case underscores **the importance of impartiality in the judiciary and adherence to established codes of conduct.**
- **The judiciary's response** will be pivotal in **maintaining public trust and upholding constitutional principles.**

10. The President's power to issue Pardon, in the United States and in India

Why in news?
U.S. President Joe Biden has issued a full and unconditional pardon to his son, Hunter Biden, for cases involving tax evasion and lying about drug use while purchasing a firearm.

Reports suggest Biden is also considering **pre-emptive pardons** for allies, including Vice President Kamala Harris, former Chief Medical Officer Anthony Fauci, and Republican Congresswoman Liz Cheney, to protect them from potential prosecution under President-elect Donald Trump.

The US President's power to pardon
- **About**
  - The President of the US has the constitutional right to pardon or commute sentences related to federal crimes.
  - The US Supreme Court has held that this power is "granted without limit" and cannot be restricted by Congress.
    - Clemency is a **broad executive power, and is discretionary**.
    - The President is not answerable for his pardons, and does not have to provide a reason for issuing one.
- **Constitutional provision**
  - **Article 2, Section II, Clause 1 of the U.S. Constitution** grants the President the power to issue pardons for federal offenses, except in cases of impeachment.
  - A pardon nullifies punishment but does not overturn convictions.
- **Historical Roots of the Pardon Power**
  - The concept of pardon originates from English legal traditions, tracing back to **King Ine of Wessex in the 7th century, who exercised the "prerogative of mercy."**
  - This authority was later delegated to colonial authorities in America before influencing the framers of the U.S. Constitution.
- **Inclusion in the U.S. Constitution**
  - In **1787, Alexander Hamilton proposed the Presidential pardon power at the Constitutional Convention**.
  - A debate followed about Senate involvement, but the power was ultimately vested solely in the President as part of the Executive branch, separate from legislative and judicial functions.
- **Role of the Office of the Pardon Attorney**
  - The Department of Justice's Office of the Pardon Attorney processes pardon petitions, conducting initial reviews and FBI background checks.
  - The office makes non-binding recommendations to the President, who has the final authority.
- **Application Process for Pardons**
  - While the President can pardon federal crimes at any time, the DoJ requires individuals to a**pply only after a five-year period following release from confinement**, demonstrating a law-abiding life during this time.

The limits of the US President's power to pardon
- **Express Limitations on Presidential Pardons**
  - **Federal Offenses Only:** The President can pardon crimes under federal law but not offenses under state laws.
  - **No Pardons in Impeachment Cases**: The President's authority does not extend to impeachment cases.
- **Implied Limitation on Pardons**
  - A **crime must first be committed for the President to issue a pardon**.
  - **As ruled in Ex Parte Garland (1866), a pardon can be granted at any stage:** before legal proceedings, during them, or after conviction and judgment.
- **Impact and Interpretation of Pardons**
  - **No Erasure of Record**: A pardon **does not remove the conviction**; both the conviction and pardon remain on the individual's criminal record.
  - **No Declaration of Innocence**: A pardon does not imply innocence, nor is it definitively considered an admission of guilt.

Pre-emptive pardons
- **Can the President pardon someone to protect them 'pre-emptively' from future criminal prosecution?**
  - The President cannot preemptively pardon future criminal acts, as clarified by the Ex Parte Garland ruling and the Constitution Annotated.

- **Preemptive Pardons for Past Crimes**
  o While not applicable to future offenses, the President can pardon individuals for crimes already committed, even before charges are filed or sentences imposed.
- **Historical examples** include:
  o **Gerald Ford pardoning Richard Nixon**: A broad pardon for any offenses Nixon "has committed or may have committed."
  o **Abraham Lincoln**: Pardoned Confederate deserters during the Civil War to encourage defections.
  o **Jimmy Carter**: Pardoned Vietnam War draft evaders who had not been charged.

The power to pardon in India
- **Presidential Pardon Powers under Article 72 of Indian Constitution**
  o The President of India is empowered to grant pardons, reprieves, respites, or remissions of punishment and to suspend, remit, or commute sentences in the following cases:
    ▪ **Court Martial**: Sentences imposed by military courts.
    ▪ **Union Law Offenses**: Punishments for offenses under laws where the Union has executive authority.
    ▪ **Death Sentences**: Cases involving the death penalty.
- **Judicial Interpretation of Article 72**
  o **Acting on Advice**: In Maru Ram v. Union of India (1980), the Supreme Court ruled that the President must act on the advice of the Central Government when granting pardons.
    ▪ Although the President is bound by the Cabinet's advice, Article 74(1) empowers him to return it for reconsideration once.
    ▪ If the Council of Ministers decides against any change, the President has no option but to accept it.
  o **Judicial Review**: Challenges to the use of Article 72 are limited to rare cases where the decision is deemed "wholly irrelevant, irrational, discriminatory, or mala fide."

11. States and the Challenge Before the Finance Commission

Context
- **The Government of Tamil Nadu recently hosted the Sixteenth Finance Commission,** chaired by renowned economist Arvind Panagariya.
- With its panel of distinguished experts, **the Commission is uniquely positioned to tackle critical fiscal challenges and rectify the existing imbalances** in the financial relationship between the Union and the States.
- **Its decisions will not only shape the economic trajectory of India for the next five years but will also set the foundation** for the country's fiscal health in the decades ahead.

Global Economic Shifts and Opportunities for Finance Commission
- The **Sixteenth Finance Commission's work comes at a time of significant global economic transformations.**
- Emerging concepts like **friend shoring and reshoring** are redefining international trade and investment.
- For India, and progressive States, **these trends offer unique opportunities.**
- However, **the challenge lies in achieving a dual objective: equitable redistribution of resources and incentivising high-performing States** to maintain their growth momentum.
- Since its inception in 1951, **each Finance Commission has sought to address the fiscal challenges of its time,** often through vertical and horizontal devolution of resources.
- **Vertical devolution pertains to the Union-State revenue sharing**, while horizontal devolution aims to allocate resources among States to bridge developmental disparities.
- **Despite these efforts**, significant **gaps between intended objectives and actual outcomes persist.**

The Case for Equitable Devolution
- **Vertical Devolution: A Need for Increased State Autonomy**

- o **Vertical devolution refers to the sharing of the central tax pool** between the Union and the States.
- o Historically, **Finance Commissions have sought to increase the States' share** to empower them in implementing developmental programs.
- o However, **the effectiveness of this mechanism has been diluted due to the Union's increasing reliance on non-divisible revenue sources** such as cesses and surcharges.
- o For instance, w**hile the Fifteenth Finance Commission recommended allocating 41% of the divisible pool to States**, the **effective devolution during the first four years of its award period stood at only 33.16%** of the Union's gross tax revenue.
- o This discrepancy arises from the Union's practice of collecting a significant portion of its revenue through cesses and surcharges, which are not shared with States.

- **Horizontal Devolution: A Shift Towards Balanced Growth**
  - o Horizontal devolution addresses the distribution of resources among States, considering factors like population, area, and developmental indicators.
  - o **While this mechanism aims to uplift less-developed States**, its **outcomes have often been suboptimal.**
  - o The **redistribution policies of the past have focused predominantly on equalising resources without adequately incentivising performance,** resulting in limited real growth in many recipient States.
  - o **This raises a critical question:** Should the **focus remain on redistributing a smaller national economic pie to less-developed States, or should the goal be to expand the national pie while ensuring equitable distribution?**
  - o A **more balanced approach is essential** and there should be a progressive resource allocation methodology.
  - o **For instance, the Finance Commission can create a system where high-performing States receive adequate resources** to sustain their growth trajectory while less-developed States are supported in achieving baseline development goals.

Challenges Faced by Progressive States
- **Declining Revenue from Consumption-Based Taxes**
  - o **Older populations typically consume less,** reducing the revenue generated from consumption-based taxes like Goods and Services Tax (GST).
  - o **For States that rely heavily on such taxes, this decline can create a fiscal deficit** that hampers their ability to fund developmental initiatives.
- **Rising Social Expenditure**
  - o As the population ages, **the demand for healthcare, pensions, and social welfare programs increases.**
  - o This **puts additional strain on the State's finances**, forcing it to allocate a larger share of its budget to non-productive expenditures.
  - o **If left unaddressed, this could lead to stagnation in developmental spending** and slow economic growth.
- **Infrastructure Development**
  - o Rapid urbanisation **necessitates massive investments in infrastructure**, including transportation networks, housing, water supply, waste management, and energy systems.
  - o **Without adequate funding, these critical projects can stagnate**, leading to overcrowded cities, inadequate public services, and declining quality of life.
- **Environmental Concerns**
  - o **Urbanisation often exacerbates environmental challenges**, such as air and water pollution, loss of green spaces, and climate-related vulnerabilities like flooding.
  - o **For a coastal State like Tamil Nadu, these risks are particularly acute** and demand proactive resource allocation to build climate-resilient cities.
- **Social Equity Issues**
  - o **Urban areas tend to attract a diverse population**, including migrant workers seeking better opportunities.
  - o This **influx can create social equity issues, such as access to affordable housing, healthcare, and education**, which require targeted interventions.
- **Rising Costs of Developmental Programs**

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- o **High-performing States are expected to maintain their momentum by investing in infrastructure**, innovation, and welfare programs.
- o However, **inadequate fiscal transfers from the Union and the burden of counterpart funding for centrally sponsored schemes** leave little room for discretionary spending.
- **Reduced Incentives for Performance**
  - o Progressive States often feel penalised for their success.
  - o **The redistribution model prioritises less-developed States,** sometimes at the expense of rewarding high-performing ones.
  - o This **lack of incentives can demotivate these States from continuing their ambitious development programs.**

Way Forward
- **The Need for Tailored Solutions**
  - o The **unique challenges faced by progressive States like Tamil Nadu highlight the need for tailored fiscal policies** and resource allocation frameworks.
  - o The **Sixteenth Finance Commission must recognise these challenges** and adopt a more nuanced approach to devolution.
  - o **By providing adequate incentives, addressing urbanisation pressures, and** supporting demographic transitions, the **Commission can ensure that these States not only sustain their growth but also serve as role models** for inclusive and sustainable development across India.
- **Envisioning a Balanced Future**
  - o The Sixteenth Finance Commission's mandate extends beyond fiscal allocations.
  - o It **must envision a future where all States,** regardless of their developmental status, **contribute to and benefit from the nation's progress.**
  - o This **involves creating manufacturing growth, addressing urbanisation challenges, and ensuring climate resilience.**
  - o The **Commission's decisions will shape not just fiscal policies but the socioeconomic fabric of the country,** influencing millions of lives and solidifying India's position as a global economic leader.

Conclusion
- The **Sixteenth Finance Commission holds immense responsibility** in recalibrating India's fiscal framework.
- **By prioritising equitable resource distribution** and incentivising high-performing States, **it can address developmental disparities without stifling progress.**
- The **Commission's decisions will serve as a cornerstone for India's journey toward inclusive and sustainable growth,** ensuring every State's potential is realized in the nation's collective advancement.

12. Citizens with Disabilities, Making Their Rights Real

Context
- **Disability rights and their governance in India have evolved significantly** over the years, marked by legislative reforms and international commitments.
- Despite these strides, **gaps remain in the implementation of disability rights** at both systemic and local levels.
- Therefore, **it is important to explore the disability prevalence in India, legislative framework, the role of state commissioners and promising practices** that could enhance the inclusion of persons with disabilities in society.

Disability Prevalence in India and Legislative Framework and Its Key Features
- **Disability Prevalence in India**
  - o India's 2011 Census recorded **2.21% of the population as persons with disabilities,** a figure widely criticized as an underestimation.

- o **A 2019 survey by the World Health Organization (WHO)** reported a severe disability prevalence rate of **16% among Indian adults**, underlining the need for more accurate data.
- o Recognising the importance of aligning its laws with international norms, **India ratified the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) in 2007.**
- **The Evolution of Disability Legislation**
  - o In response to its international commitments, India replaced the Persons with Disabilities (Equal Opportunities, Protection of Rights, and Full Participation) Act of 1995 **with the Rights of Persons with Disabilities Act (RPWD Act) in 2016.**
  - o **The 1995 law was largely inadequate**, as it primarily focused on limited categories of disabilities and failed to fully address systemic discrimination or ensure equal opportunities for persons with disabilities.
  - o **The RPWD Act marked a paradigm shift** by incorporating the principles of dignity, respect, and inclusion outlined in the UNCRPD.
- **Key Features of the RPWD Act**
  - o The RPWD Act **stands out for its comprehensive and forward-looking approach.**
  - o It **guarantees a range of civil, political, social, and economic rights**, including non-discrimination in employment, education, and public services.
  - o It **mandates that both public and private sectors reserve 4% of jobs for persons with disabilities**, while also ensuring accessible infrastructure, transportation, and communication systems.
  - o Additionally, **the act includes provisions for reasonable accommodation, allowing persons with disabilities to access opportunities** on an equal basis with others.
  - o One of the most innovative features of the RPWD Act is its recognition of intersectionality.
  - o **By acknowledging that persons with disabilities often face compounded forms of discrimination** based on gender, caste, and socio-economic status, **the act emphasises the need for targeted interventions.**

The Role of State Commissioners for Disabilities, Power, and Legal Responsibilities

- **The Role of State Commissioners**
  - o The establishment of State Commissioners for Disabilities under the **RPWD Act** represents a significant step toward ensuring the rights and welfare of persons with disabilities in India.
  - o This **office was designed to function as a watchdog**, mediator, and enforcer of disability laws at the state level.
  - o However, despite its promise, t**he office of the State Commissioner faces several challenges,** ranging from structural inefficiencies to implementation bottlenecks.
- **Legal Powers and Responsibilities**
  - o Under Section 82 of the RPWD Act, **State Commissioners are vested with quasi-judicial powers** to oversee and ensure the enforcement of disability laws.
  - o **State Commissioners can inquire into complaints regarding the denial of rights** or discrimination against persons with disabilities.
  - o They can propose remedial measures to address gaps in policy, implementation, or systemic discrimination.
  - o **The office monitors the enforcement of laws**, schemes, and programs meant for the welfare of persons with disabilities.
  - o **Commissioners can proactively investigate policies or actions** that contravene the provisions of the RPWD Act, without waiting for a formal complaint.

An Analysis of the Challenges Surrounding the Role of State Commissioners for Disabilities

- **Structural Flaw: Appointment Challenges**
  - o The appointment process of State Commissioners is a significant concern.
  - o **The RPWD Rules encourage appointing individuals with expertise in human rights**, law, education, and social work.
  - o Yet, **most commissioners are civil servants from the nodal ministry,** which undermines the independence of the role.

- o **According to a 2021-22 report, only eight states have appointed non-civil service commissioners** creating a conflict of interest and diminishing accountability.
- o This **structural flaw has resulted in delays, inefficiencies, and a lack of trust** in the office of the State Commissioners.
- **Lack of Proactive Engagement**
  - o **State Commissioners often fail to exercise their suo motu powers** to address discriminatory practices and policies.
  - o This **passivity erodes the faith of persons with disabilities** in these statutory offices.
  - o To rectify this, **commissioners must actively engage with persons with disabilities and their representative organisations** to identify and address systemic violations of the RPWD Act.
  - o This passivity has led to an erosion of trust among persons with disabilities, many of whom feel their grievances are not taken seriously.
  - o **Greater engagement with stakeholders, including grassroots organizations, is necessary** to restore confidence in the office.

Necessary Measures to Enhance the Inclusion of Persons with Disabilities
- **Positive Examples of State-Level Leadership**
  - o **Karnataka and Delhi**
    - The State Commissioner's office in Karnataka has **implemented several innovative practices, such as organising mobile adalats (mobile courts) to bring justice** closer to persons with disabilities in remote areas.
    - These **adalats resolve grievances on the spot**, reducing the burden of bureaucracy and ensuring timely redressal.
    - **The Delhi office has earned the trust of the disability community by actively addressing complaints and developing partnerships** with legal experts and civil society organizations.
  - o **District Disability Management Review (DDMR)**
    - Another initiative by Karnataka, **the DDMR monitors the implementation of welfare schemes and quotas for persons** with disabilities at the district level.
    - **This model provides a structured mechanism to hold departments accountable** and ensure the inclusion of persons with disabilities in development programs.
- **Research and International Collaboration**
  - o Research is a critical but underutilised function of State Commissioners.
  - o **Collaborating with United Nations agencies and academic institutions can help address pressing issues** such as the impact of climate change on persons with disabilities and disability-inclusive social protection.
  - o **Evidence-based research can guide policy reforms**, ensuring that they align with global best practices and the UN Disability Inclusion Strategy.

Conclusion
- **While India has made significant progress** in legislating disability rights, **the effective implementation of these rights remains a challenge.**
- **Strengthening the role of State Commissioners by ensuring impartial appointments, enhancing their capacity,** and adopting inclusive governance practices **is essential for achieving the goals of the RPWD Act.**
- **By cultivating collaboration**, research, and proactive engagement, **India can pave the way for a more inclusive society that respects the rights and dignity of persons with disabilities.**

General Studies III

1. Incidents on Loop, But It's Escape for Regulator, Airlines

Context
- **The aviation industry in India has witnessed several safety lapses**, the most recent being the incident on December 5, 2024, involving an Air India Airbus A320 at Goa's Mopa Airport.
- **The Hyderabad-bound aircraft mistakenly entered a parallel taxiway instead of the main runway,** leading to a rejected take-off. This event underscores a recurring issue in Indian aviation: runway confusion.
- The **incident raises concerns about systemic failures in aviation safety oversight, pilot training, and accountability mechanisms, reflecting broader issues** within the Directorate General of Civil Aviation (**DGCA**) and airlines.

A History of Safety Lapses
- India's aviation history is **rife with incidents of runway confusion.**
- From a Jet Airways flight mistakenly landing at an Indian Air Force base in 1993 to a SpiceJet aircraft landing on the wrong runway in 2008, **such errors highlight persistent safety deficiencies**.
- More recent examples, **such as the Air India A320 landing on an under-construction runway in the Maldives (2018)** and **a SpiceJet aircraft's hard touchdown in Guwahati (2020),** illustrate a pattern of oversight failures.
- Fortunately, **these incidents have not resulted in fatalities, but the potential for disaster is ever-present.**

An Analysis of Systemic Accountability Deficit
- **Failure of the DGCA**
  - As the primary regulatory body for civil aviation in India, **the DGCA bears the responsibility of ensuring compliance with safety standards.**
  - However, **its track record reveals a consistent failure to address root causes of incidents. Instead of initiating comprehensive investigations**, the DGCA often attributes incidents to pilot error, conveniently absolving itself and airlines of accountability.
  - **This approach violates the International Civil Aviation Organization (ICAO)'s Annex 13**, which mandates thorough investigations into incidents and the implementation of corrective measures to prevent recurrence.
  - For example, **after runway confusion incidents in the past, such as the 2018 Air India A320 landing on an under-construction runway in the Maldives, the DGCA failed to enforce stricter pilot training** or infrastructure upgrades.
  - The **lack of meaningful action demonstrates the regulator's inability to learn from past mistakes,** leaving the aviation sector vulnerable to similar risks.
- **Ineffectiveness of Safety Audits**
  - **Safety audits conducted by the DGCA and the Airports Authority of India (AAI) are often superficial,** with significant deficiencies overlooked or underreported.
  - **Many Indian airports fail to meet ICAO standards for runway infrastructure, lighting, and markings,** which are critical for pilot decision-making, especially during adverse conditions.
  - Despite these shortcomings**, audits seldom lead to corrective measures, perpetuating a cycle of negligence.**
  - For instance, **the failure to address issues like inadequate runway markings and poor aerodrome design directly contributes to runway confusion** and other errors.
  - Yet, year after year, **these deficiencies persist, signalling a lack of enforcement and accountability.**
- **Airlines' Role in Safety Lapses**
  - **Airlines in India also bear significant responsibility for safety lapses** due to their cost-cutting measures and operational priorities.
  - Instead of investing in rigorous pilot training and enhanced safety protocols, **many airlines prioritise profitability and operational efficiency.**

- o The emphasis on **on-time performance (OTP) further exacerbates the problem**, as pilots and crew are pressured to meet tight schedules, often at the expense of safety.
- o **This pressure was evident in the Kozhikode (2020) and Mangaluru (2010) crashes**, where pilots' decisions to land despite unsafe conditions were influenced by operational demands.
- o Despite these incidents, **airlines have continued to sideline safety concerns**, relying on the DGCA's lenient oversight to avoid accountability.

- **The Culture of Blame-Shifting**
  - o The **systemic accountability deficit is perpetuated by a pervasive culture of blame-shifting**, where pilots are often scapegoated for incidents.
  - o **This narrative deflects attention from broader systemic issues**, such as inadequate training programs, substandard infrastructure, and regulatory failures.
  - o **The aviation industry's tendency to label incidents as pilot error not only undermines the credibility of investigations but also prevents meaningful reforms** from being implemented.
  - o Moreover, **this culture discourages open reporting of safety concerns**.
  - o **Pilots and crew, fearing punitive action, may hesitate to highlight operational or regulatory shortcomings**, further eroding safety standards.

The Role of Poor Training and Infrastructure and Operational Pressures on Crew

- **The Role of Poor Training and Infrastructure**
  - o Runway confusion incidents point to **glaring deficiencies in pilot training and aerodrome infrastructure.**
  - o **Pilots' lack of familiarity with runway markings** and failure to comply with stabilised approach criteria are **indicative of inadequate training programs.**
  - o Moreover, **India's aviation infrastructure often fails to meet ICAO standards,** exacerbating safety risks.
  - o Safety audits by the DGCA and the AAI have historically overlooked critical deficiencies, further compromising safety standards.
- **Operational Pressures on Crew**
  - o **A significant contributor** to these incidents is the **operational pressure on flight crews.**
  - o **India's regulations on flight and duty time limitations are among the weakest globally,** allowing airlines to push pilots and cabin crew to their limits.
  - o High-profile accidents like the **Kozhikode (2020) and Mangaluru (2010)** crashes exemplify the dangers of such pressures, **where pilots ignored co-pilot warnings in their haste to meet schedules.**

Judiciary and Legislative Challenges and the Path Forward

- **Judiciary and Legislative Challenges**
  - o India's approach to aviation safety is **further undermined by judicial and legislative decisions that prioritise commercial interests over safety.**
  - o The **recent deferment of stricter flight and duty time limits under pressure from airlines reflects a disregard for crew fatigue** and its impact on safety.
  - o Additionally, **judicial interventions, such as the High Court asking the DGCA to mediate between stakeholders**, highlight a lack of understanding of aviation safety's non-negotiable nature.
- **The Path Forward**
  - o **India must adopt a proactive and holistic approach** to address aviation safety challenges.
  - o The **DGCA and airlines must be held accountable** for implementing robust training programs and complying with international safety standards.
  - o **Lessons can be drawn from Singapore's example**, emphasising swift corrective actions and a culture of accountability.
  - o F**urthermore, the judiciary and regulatory bodies must prioritise safety over commercial interests,** recognizing that crew fatigue and operational pressures are critical safety issues.

Conclusion

- **The December 2024 incident at Goa's Mopa airport is not an isolated event** but a symptom of deeper systemic issues in Indian aviation.
- **Addressing these challenges requires a collective effort from regulators, airlines, and policymakers to create a culture of accountability, prioritise crew welfare**, and enhance safety standards.
- As India's aviation industry grows, **ensuring safety must remain paramount, lest the nation continues to 'cut a sorry figure' in international aviation.**

2. Tech Trends 2024 and Beyond (AI, Innovations, and Emerging Challenges)

Why in News?
2024 has been a transformative year for technology, particularly Artificial Intelligence (AI). This year marked significant advancements in AI, responsible tech, and greener innovations, while also revealing challenges in adoption and ethical considerations.
Predictions for 2025 hint at further developments and shifts in the tech landscape.

Tech Developments in 2024 (Key Highlights):
- **AI's growing influence:**
  o AI became all-**pervasive, impacting various sectors and introducing existential questions**.
  o Companies have recognised AI's potential but are recalibrating use cases due to difficulties in realising immediate returns.
  o For individuals, **AI acts as a "copilot**," supporting but not replacing human creativity and specialised skills.
- **Responsible AI and ethical concerns:**
  o The focus on responsible AI highlighted the importance of **ethical considerations in deployment.**
  o AI agents raised questions about autonomy and human intervention, particularly in sensitive areas like **healthcare and finance.**
- **Greener tech and sustainability:** Efforts to integrate sustainable practices into technology gained momentum, reinforcing the importance of eco-conscious innovations.
- **Missed predictions:** Though these trends gained popularity worldwide, predictions regarding the prevalence of a "cookieless world" and extended reality in India were not met.

Tech Predictions for 2025:
- **AI agents revolutionise automation:**
  o **Adoption and capabilities:**
    ▪ AI agents capable of autonomous learning and decision-making will become prevalent.
    ▪ Use cases include **handling routine tasks, data processing, and generating alert**s for human oversight.
  o **Consumer impact:** Personalised AI agents may shift interactions beyond the current chat-driven paradigm.
- **Death of dashboards:**
  o **GenAI in analytics:** Generative AI tools are set to replace traditional dashboards, answering complex queries with visual insights and predictions.
  o **Data evolution:** Data collection formats will adapt to support advanced analytics, requiring greater granularity and complexity.
- **Rise of not-so-social media:**
  o **Platform challenges:** TikTok faces uncertainty despite its popularity. Platforms like X (formerly Twitter) and Facebook struggle to retain users.
  o **User shifts:** Closed-group platforms and niche networks are gaining popularity among younger audiences.
- **Unmatched computing power:**
  o **Quantum leap:** Innovations like **Google's Willow chips and NVIDIA's GPUs** are pushing computing boundaries.

- o **Data challenges:** Computational advancements highlight the need for robust, complex data models to leverage full potential.
- **AI meets hardware:**
  - o **Early failures and new hope:** Initial AI hardware attempts (e.g., Humane AI Pin) faced setbacks. 2025 might witness a new wave of AI-integrated hardware with targeted functionalities.
  - o **Innovative devices:** Possible advancements include AI-led smartphones and laptops, replacing traditional apps and operating systems with AI agents.

Conclusion:
- 2024 underscored AI's transformative potential while revealing its limitations and ethical implications.
- **Predictions for 2025 suggest continued innovation, particularly in AI agents, analytics, and computing power.**
- The tech landscape is set for significant shifts as companies and users adapt to these advancements, navigating both opportunities and challenges.

3. Strengthening Fisheries Extension Services in India

Introduction:
- India, with its diverse aquatic resources, plays a pivotal role in global fisheries and aquaculture.
- The sector **provides livelihood to more than 25 million fishers and fish farmers at the primary level** and twice the number along the value chain.
- India is the **3rd largest fish producing country**, contributing 8 percent to the global fish production and ranks **2nd in aquaculture production**.
- The fish production in 2021-22 is 16.24 Million Tonnes (MTs) comprising of marine fish production of 4.12 MTs and 12.12 MTs from Aquaculture.

Importance of Fisheries Extension Services:
- Fisheries extension services bridge the gap between scientific advancements and fish farmers' practices, ensuring:
  - o **Knowledge Transfer**: Guidance on species lifecycle management, water quality, disease control, and rearing technologies.
  - o **Capacity Building**: Training on sustainable practices and promoting fisheries as viable business models.
  - o **Sustainable Practices**: Addressing the challenges posed by climate change and overfishing through regenerative and conservation management.

Key Government Initiatives:
- **Matsya Seva Kendras (MSKs)**:
  - o Launched under the **Pradhan Mantri Matsya Sampada Yojana (PMMSY)**, MSKs serve as **one-stop centres** for fisheries-related services.
  - o **Role and Features**:
    - Provide disease testing and water/soil analysis.
    - Train fishers on seed/feed technology and sustainable practices.
    - Mobilize startups, cooperatives, self-help groups, and Fish Farmer Producer Organizations (FFPOs) to share best practices.
  - o **Examples**:
    - MSK in Thrissur, Kerala: Offers advanced water and soil testing services.
    - MSKs in Nasik and Sangli, Maharashtra: Focus on capacity building with technological inputs.
- **Sagar Mitras**:
  - o Deployed in **coastal states and union territories**, Sagar Mitras act as intermediaries between the government and marine fishers.
  - o **Key Functions**:

- - Provide information on weather forecasts, fishing zones, and marketing needs.
  - Educate fishers on local regulations, hygienic fish handling, and disaster preparedness.
- **Digital Platforms**:
- o **AquaBazaar**: A virtual learning platform initiated by the National Fisheries Development Board. It offers:
  - Expert guidance on breeding and seed production.
  - Practical demonstrations to enhance fishers' knowledge.
- **World Bank-Assisted Project**:
- o Aims to formalize the fisheries and aquaculture sector by creating **work-based digital identities** for fishers and fish farmers.
- o Focuses on capacity building, awareness generation, and streamlining extension services.

Challenges in Fisheries Extension Services:
- **Fragmentation**: Lack of coordination among multiple initiatives.
- **Digital Divide**: Limited digital literacy and infrastructure in rural areas.
- **Climate Change**: Unpredictable weather patterns and resource depletion demand adaptive strategies.

Way Forward:
- **Institutional Convergence**: Integrate fisheries extension services with the **Krishi Vigyan Kendras (KVKs)** and state agricultural departments to leverage existing networks.
- **Promote Digital Outreach**: Expand platforms like AquaBazaar to ensure wider access to knowledge and training.
- **Public-Private Partnerships**: Encourage private sector involvement in technology dissemination and capacity building.
- **Focus on Climate Resilience**: Develop strategies for sustainable resource management in the face of environmental changes.

Conclusion:
- Strengthening fisheries extension services is critical to sustaining India's growth in the fisheries and aquaculture sector.
- By enhancing last-mile connectivity, integrating digital tools, and fostering collaborations, India can empower its fishers and fish farmers to adopt sustainable practices and contribute to the nation's economic and ecological well-being.

4. 20 Years After Indian Ocean Tsunami, India is Better Prepared

Context
- **On December 26, 2004, a catastrophic event** forever **changed the way the world perceived natural disasters and preparedness.**
- A **9.1 magnitude earthquake beneath the seabed off Indonesia unleashed a massive tsunami,** devastating countries bordering the Indian Ocean including India, **particularly the Andaman and Nicobar (A&N) Islands and the southern coastline.**
- Twenty years later, **reflections on this tragedy reveal the remarkable progress made in disaster preparedness** while underscoring the importance of continued vigilance and innovation.

The Tragedy and its Immediate Aftermath
- In 2004, the **lack of a robust warning system and limited public understanding of tsunamis resulted in immense human and material losses.**
- The **tsunami struck the A&N Islands within 20 minutes of the earthquake,** and its waves travelled to India's mainland and Sri Lanka within hours.

- With no early warning (EW) mechanism in place, **people were caught off guard, exacerbating the scale of destruction.**
- **The tragedy starkly highlighted deficiencies in India's seismic monitoring network** and reliance on international seismic data, which delayed critical warnings.

Institutional and Technological Responses
- **Establishment of Institutional Frameworks**
  - o **One of the most critical institutional responses** to the tsunami was the **enactment of the Disaster Management Act of 2005**, which created a legal framework for disaster preparedness, mitigation, and response.
  - o This **legislation led to the formation of the National Disaster Management Authority (NDMA)**, tasked with coordinating, and implementing disaster management plans across the country.
  - o The **NDMA also emphasised integrating disaster risk reduction (DRR) into development planning and policies**, ensuring that disaster preparedness became a central part of governance.
  - o Additionally, **state-level disaster management authorities were established to decentralise disaster response** and allow tailored approaches based on local vulnerabilities.
  - o **The NDMA, in collaboration with these state bodies, introduced training programs, guidelines, and awareness campaigns** to enhance community resilience.
- **Recognition of Collaboration between Civilian and Military Agencies**
  - o The tragedy also led to the **recognition of the importance of collaboration between civilian and military agencies.**
  - o The **Indian Armed Forces have since become key players in disaster response operations**, offering logistical support, rapid mobilisation, and expertise during crises.
  - o **Joint exercises, like those conducted at the Headquarters Andaman and Nicobar Command (HQ ANC), further enhance the readiness of armed forces** and civilian agencies to work together seamlessly.
- **Development of Early Warning Systems**
  - o Technological advancements have been at the forefront of India's efforts to prevent a recurrence of the 2004 disaster.
  - o The establishment of the **Indian Tsunami Early Warning Centre (ITEWC) at the Indian National Centre for Ocean Information Services (INCOIS) in Hyderabad marked a significant leap forward.**
  - o Operational since 2007, **the ITEWC is now among the most advanced tsunami warning centres globally.**
  - o **The ITEWC operates a real-time seismic monitoring network capable of detecting tsunamigenic earthquakes both in the Indian Ocean and globally within 10 minutes** of their occurrence.
  - o **This is made possible through a network of seismic stations and the integration of international seismic data,** ensuring comprehensive monitoring coverage.
- **Sea Level Monitoring, Communication and Dissemination**
  - o Tide gauges and deep-ocean assessment and reporting of tsunamis (**DART**) buoys are deployed strategically across the Indian Ocean to monitor changes in sea level.
  - o **These sensors detect abnormal variations** that may indicate the onset of a tsunami, complementing seismic data to improve the accuracy of warnings.
  - o **The ITEWC has developed a robust advisory dissemination system** to ensure timely communication of alerts.
  - o **Warnings are transmitted to government agencies, disaster management authorities, and even neighbouring countries** under the UNESCO-led Intergovernmental Oceanographic Commission framework.
  - o **India has assumed a leadership role in this regard, offering tsunami-related services to 26 Indian Ocean region countries.**
- **Enhancing Preparedness Through Technology**
  - o The **introduction of the Common Alerting Protocol (CAP) has significantly improved the dissemination of warnings.**
  - o CAP integrates data from ITEWC with **GIS mapping tools to issue location-specific advisories**.

- o **Alerts are sent to millions of mobile phones within minutes**, using polygon-drawn geographies to target affected areas accurately.
- o Moreover, **plans to implement a modern cell broadcast system promise even greater reliability.**
- o **This technology will allow rapid delivery of warnings to a broader audience**, ensuring that coastal communities receive life-saving information with minimal delay.
- **Broader Applications of Technology**
  - o While these advancements focus on tsunamis, **the technologies are being extended to address other hazards, including cyclones, lightning strikes, and Glacial Lake Outburst Floods** (GLOFs).
  - o The **government's emphasis on multi-hazard risk mapping underscores a commitment to a comprehensive approach** to disaster management.
  - o For example, **Odisha's recognition of 'tsunami-ready' villages,** involving evacuation drills and community awareness campaigns, r**eflects how these technologies and institutional frameworks are being translated into actionable plans at the grassroots level.**

Grassroots Preparedness and, Community Engagement and Reflecting on Progress

- **Grassroots Preparedness and Community Engagement**
  - o India's disaster management strategies have **increasingly emphasised community-level preparedness.**
  - o **Community involvement ensures that the most vulnerable populations are equipped to respond** effectively to threats.
  - o **Technology has played a pivotal role in these advancements.** The CAP and GIS-based risk mapping enable real-time communication of warnings to millions of mobile phones.
  - o This **system is poised for further enhancement with the development of modern cell broadcast technologies**, promising faster and more reliable dissemination of alerts.
- **Reflecting on Progress**
  - o The **annual Dweep Diksha Dialogue,** hosted by the HQ ANC, **exemplifies the growing integration of knowledge exchange, technical advancements, and strategic planning in DRR.**
  - o The **inclusion of tsunami survivors,** experts, and service officers from Indian Ocean Region (IOR) countries **ensures a holistic approach to disaster preparedness.**
  - o **Discussions extend beyond tsunamis to encompass hazards such as cyclones,** lightning, and glacial lake outburst floods, **reflecting a comprehensive DRR strategy.**
  - o **India's armed forces and political leadership deserve commendation** for their roles in driving these developments.
  - o The **NDMA's dedication to fostering disaster resilience**, aligned with the Prime Minister's Ten-Point Agenda on DRR, **illustrates a proactive and forward-thinking approach.**

Conclusion

- **The 2004 tsunami was a devastating reminder of nature's unpredictability** and the vulnerabilities of unprepared communities.
- **Two decades later, India has transformed this tragedy into a powerful lesson**, building robust systems for disaster detection, preparedness, and response.
- While much progress has been made, **the journey towards comprehensive disaster resilience is ongoing.**
- **By continuing to invest in technology, education, and international collaboration, India can honour the memory of those lost in 2004** while safeguarding its future generations from similar tragedies.

5. MoSPI modifying CPI base year

Why in the News?

The Ministry of Statistics and Programme Implementation (MoSPI) is modifying the **Consumer Price Index (CPI) base year by updating CPI weights and baskets.**

Consumer Price Index (CPI):

- The CPI measures the **average change in prices of a fixed basket of goods and services that households typically consume.**
- It reflects how the purchasing power of money changes over time due to inflation.
- **Components**: CPI includes various categories, such as:
  o **Food and Beverages**: Items like cereals, pulses, vegetables, milk, meat, and beverages.
  o **Housing**: Rent or imputed rent for self-occupied houses.
  o **Clothing and Footwear**: Costs of garments, footwear, and other related items.
  o **Fuel and Light**: Includes LPG, kerosene, firewood, and electricity.
  o **Miscellaneous**: Education, healthcare, transport, communication, and recreation expenses.
- **Publishing Authority**: The Ministry of Statistics and Programme Implementation (MoSPI) is responsible for compiling and releasing CPI data.

Types of CPI:

- **CPI for Industrial Workers (CPI-IW)**:
  o Tracks price changes for industrial workers.
  o **Base Year: 2016**
  o Used for wage adjustments in organized labor.
- **CPI for Agricultural Labourers (CPI-AL) and Rural Labourers (CPI-RL)**:
  o Measures inflation for rural and agricultural laborers.
  o Base Year: **1986-87**
- **CPI (Urban), CPI (Rural), and CPI Combined**:
  o Measures retail inflation at a national level.
  o Base Year: **2012**
  o **CPI Combined** is widely used as the official retail inflation rate in India.

How CPI Is Calculated?

- CPI is calculated using the following formula:

$$CPI = \frac{\text{Cost of Basket in Current Year}}{\text{Cost of Basket in Base Year}} \times 100$$

- **Here:**
  o The **basket of goods and services** represents typical household consumption.
  o The **base year** serves as a reference point for comparison (currently 2012, likely to be revised to 2024).

Purpose of CPI:

- **Tracking Inflation**: CPI helps monitor the rate at which prices are rising or falling.
- **Policy Formulation**: RBI uses CPI as the primary metric for inflation targeting, maintaining it at 4% ± 2%.
- **Wage and Pension Adjustments**: CPI is used to revise salaries and pensions, especially in government sectors.
- **Economic Analysis**: It provides insights into consumption trends and economic health.

Key Issues in the Current CPI:

- **Exclusion of Free PDS Items**:
  o **Free goods distributed under the Public Distribution System** are currently excluded as they do not involve direct monetary transactions.
  o This aligns with international practices and recommendations, such as those by the **International Monetary Fund (IMF), which suggest excluding non-monetary transactions from CPI.**
- **Challenges with PDS Inclusion**:

- o Redistribution of weights for free items has occasionally caused inflation spikes.
- o Free items complicate inflation calculation as their inclusion may distort the measure of consumer expenditure.

Proposed Changes in the New CPI Series:
- The **MoSPI is revising the CPI methodology with 2024 as the new base year.** Key changes under consideration include:
  - o **Inclusion of PDS Items**:
    - ▪ Reflecting free PDS items at a **zero price, with future adjustments as weights change**.
    - ▪ This could lower headline inflation figures but requires significant adjustments to the CPI calculation process.
  - o **Redistribution of Weights**:
    - ▪ Restrict redistribution to the same category (current practice).
    - ▪ Broader redistribution across the entire CPI basket for greater accuracy.
- **Stakeholder Consultation**:
  - o The **new CPI series is expected to roll out by the final quarter of FY26**, post stakeholder consultations and technical adjustments.
  - o MoSPI has invited inputs from experts, academicians, and the public on the proposed treatment of free PDS items, with the deadline set for January 15, 2025.

Rationale Behind the Proposed Changes:
- **Economic Representation**:
  - o The **Chief Economic Advisor (CEA)** and other experts argue that excluding free PDS items undermines the true representation of market conditions.
  - o With increased free food grain distribution during economic crises, including these items may provide a more accurate inflation measure.
- **Alignment with Household Expenditure**:
  - o The updated CPI will derive weights from the 2022–23 Household Consumption Expenditure Survey (HCES), ensuring the basket reflects current consumption patterns.

Methodological Challenges:
- **Compliance with International Norms**:
  - o Global practices recommend limiting CPI to monetary transactions, complicating the inclusion of free PDS items.
- **Mid-Series Adjustments**:
  - o Adapting ongoing CPI series to account for changes in PDS pricing—such as shifting from zero to positive prices—presents statistical challenges.
- **Impact on Headline Inflation**:
  - o Including free items may lower inflation figures, but it risks skewing the index's purpose of capturing monetary price movements.

Broader Implications:
- **Policy Decisions**:
  - o The revised CPI will serve as a critical input for monetary policy, helping the RBI frame more accurate inflation-targeting measures.
- **Global Trade Considerations**:
  - o As India aims to align its statistical practices with international standards, changes in CPI methodology may affect global investor perceptions.

Conclusion:
- The ongoing deliberations on including free PDS items in CPI aim to enhance the index's robustness and accuracy.

- While aligning with international best practices, India's revised CPI could better capture the dynamics of consumer expenditure and inflation in a rapidly evolving economic landscape.
- Stakeholder feedback and meticulous planning will be crucial to navigating the statistical and policy complexities of these changes.

6. A beginner's guide to quantum computing

Context:
Quantum computing, rooted in **quantum mechanics, promises to solve complex problems beyond the reach of classical computers.** Proposed by **Richard Feynman in 1982** to simulate quantum systems, it emerged as a solution to classical computers' limitations.
Since then, progress includes the development of qubits (using superposition and entanglement), improved error correction, and scalable hardware, paving the way for applications in cryptography, optimization, and drug discovery.

Quantum computing
- **Classical Computing: Bits as Units of Information**
  o Classical computers operate based on **principles of classical physics**.
  o The **basic unit of information is the bit**, which can be either 0 or 1.
  o All types of information can be represented using combinations of 0s and 1s in the binary system.
- **Quantum Computing: Qubits as Fundamental Units**
  o **Quantum computers rely on quantum bits, or qubits, for computations.**
  o Qubits can represent 0, 1, or a state that is partly 0 and partly 1 simultaneously.
  o This ability to exist in multiple states is unique to qubits and enables quantum computations.
- **Key Principles**
  o **Superposition: A Key Quantum Principle**
    ▪ Qubits can exist in a **state of superposition**, holding both 0 and 1 at the same time.
    ▪ **Example:** A spinning coin that represents both heads and tails simultaneously until it collapses to one state when observed.
    ▪ Superposition allows quantum computers to perform multiple computations at once.
  o **Entanglement: Quantum Correlation**
    ▪ Qubits can be **entangled, meaning their states are intrinsically linked, even if they are far apart**.
    ▪ Measuring one qubit instantly provides information about the other, regardless of distance.
    ▪ **Example:** If a pair of gloves are kept in separate boxes, opening one reveals the other's state instantly.
    ▪ Entanglement enables faster information processing through shared states.
- **Advantages of Quantum Principles**
  o Superposition allows **quantum computers to process exponentially more data than classical computers**.
  o Entanglement facilitates simultaneous information sharing, speeding up computations.
  o These principles, rooted in quantum mechanics, unlock the immense potential of quantum computing, beyond the scope of classical physics.

Significant Milestones in Quantum Computing
- **Quantum Computers vs. Classical Computers**
  o Quantum computers are technologically advanced but may not always outperform classical computers in every task.
  o Specific tasks have been developed to demonstrate the unique capabilities of quantum computing.
- **Shor's Algorithm: Revolutionizing Factorization (1994)**
  o Created by **Peter Shor**, this algorithm can factorize large numbers in moments, compared to millions of years required by classical computers.

- o Major implications for data security, as it can quickly solve problems like large-number factorization, which are used to secure encrypted data.
- **IBM's Q System One: The First Commercial Quantum Computer (2019)**
  - o **IBM introduced Q System One, the world's first circuit-based commercial quantum computer.**
  - o Circuit-based designs with quantum gates are versatile and suited for general quantum-computing applications.
- **Google's Sycamore Processor: Achieving Quantum Supremacy (2019)**
  - o Google's 53-qubit Sycamore processor solved a problem in 200 seconds that would take a supercomputer 10,000 years.
  - o This milestone marked quantum supremacy, where quantum computers outperform classical counterparts for specific tasks.
- **Google's Willow Quantum Chip: Scaling with Error Correction (2024)**
  - o **Google unveiled Willow**, the first quantum processor with error-corrected qubits that improve as they scale.
  - o Quantum error correction is critical to maintaining quantum states long enough for meaningful calculations.
  - o Willow completed a standard test in 5 minutes, a task that would take the best supercomputers 10 trillion trillion years.
- **Progress and Potential**
  - o These milestones illustrate the rapid advancement of quantum computing, showcasing its potential to solve complex problems far beyond the reach of classical systems.

Present Limitations of Quantum Computing
- **High Cost and Complexity**
  - o Building quantum computers is **extremely expensive and technically complex.**
  - o Maintaining the stability of qubits is challenging due to high error rates and issues like decoherence caused by environmental noise.
- **Need for Larger-Scale Quantum Systems**
  - o Current quantum computers have limited qubits, but solving major problems (e.g., drug discovery, astronomical research) requires millions of qubits.
  - o Scaling quantum systems to such levels remains a significant hurdle.

National Quantum Mission: India's Commitment (2023)
- Recognizing the potential of quantum computing, **India launched the National Quantum Mission.**
- The government allocated ₹6,000 crore over eight years to advance quantum technology and develop quantum computers.

The Road Ahead
- While the challenges are substantial, the advancements and investments highlight the clear potential and promise of quantum computing.

7. Rationalising Subsidies and Strengthening Fiscal Management

Introduction:
- RBI has raised concerns over the rising expenditure of states on subsidies and highlighted the need for rationalization to ensure fiscal sustainability.
- These observations were made in the report titled "**State Finances: A Study of Budgets of 2024-25**", released recently.
- The report sheds light on pressing fiscal challenges such as subsidy rationalization, debt consolidation, and expenditure efficiency.

Key Concerns Raised by the RBI:

- **Subsidy Expenditure:**
  o States have significantly increased spending on **subsidies**, including:
    - **Farm loan waivers**
    - **Free or subsidised services** (electricity, transport, gas cylinders)
    - **Cash transfers to farmers, youth, and women**
- Such subsidies often crowd out spending on critical infrastructure and developmental projects.
- **Rising Subnational Debt:**
  o While state debt as a percentage of GDP declined from **31.8% in 2004** to **28.5% in 2024**, it remains above the **20% threshold** recommended by the **Fiscal Responsibility and Budget Management (FRBM) Review Committee (2017)**.
  o Persistent high debt levels necessitate a transparent and time-bound roadmap for **debt consolidation**.
- **Cooperative Fiscal Federalism:**
  o The proliferation of **Centrally Sponsored Schemes (CSS)** reduces flexibility in state spending.
  o Rationalising CSS can provide budgetary space for states to address specific local needs while reducing fiscal stress for both the Union and state governments.

Recommended Measures:
- **Rationalisation of Subsidies:**
  o States need to **contain and streamline subsidy outgoes** to prioritise more productive expenditure areas such as education, healthcare, and infrastructure.
  o Example: Delhi's **Mukhya Mantri Mahila Samman Yojna**, offering monthly financial assistance to women, is one of many schemes contributing to rising subsidy burdens.
- **Debt Consolidation:**
  o Adopting a clear and transparent **debt consolidation strategy** aligned with macroeconomic goals can ensure **debt sustainability** and **economic resilience**.
- **Efficiency in Public Expenditure:**
  o **Outcome budgeting** (A budgeting method where expenditure is linked to measurable outcomes, ensuring resources are used efficiently) is proposed to link spending with measurable outcomes, ensuring:
    - **Accountability in resource allocation**
    - Focus on high-impact developmental projects
    - Greater public trust and transparency
- **Climate Budgeting:**
  o States are urged to adopt **climate budgeting** to integrate **climate action** into fiscal planning, ensuring sustainability in resource use.
- **Enhancing Fiscal Transparency:**
  o Reliable, comprehensive, and timely fiscal data is essential for better **risk assessment**.
  o Transparent reporting of **off-budget borrowings** can reduce borrowing costs and improve fiscal discipline.
    - **Off-Budget Borrowings**: Loans taken by government-related entities not reflected in the official budget, which can obscure fiscal liabilities.

Significance of the Recommendations:
- **Rationalising Subsidies:**
  o **Reduces fiscal burden** and ensures resources are channelled toward long-term development.
  o Frees up funds for sectors such as **infrastructure and education, fostering economic growth**.
- **Debt Consolidation:**
  o Aligning state debt levels with **FRBM Committee recommendations** can strengthen fiscal stability.
  o Transparent debt strategies boost investor confidence and lower borrowing costs.
- **Cooperative Federalism:**
  o Rationalising CSS aligns state and central objectives, reducing duplication and inefficiency in spending.

- **Climate Action:**
  - Climate budgeting promotes **sustainable development**, addressing both ecological and economic goals.
- **Fiscal Discipline and Transparency:**
  - Enhanced reporting standards improve decision-making and foster **public accountability**.

Conclusion:
- The RBI's recommendations underscore the importance of **rationalising subsidies**, improving expenditure efficiency, and ensuring fiscal transparency.
- These steps are essential for **fostering sustainable development while addressing mounting fiscal challenges**.
- By implementing such measures, states can strike a balance between meeting immediate social needs and achieving long-term economic resilience.

8. Understanding Carbon Markets and Their Role in Combating Climate Change

What is a Carbon Market?
- A **carbon market** is a system that allows the **buying and selling of the right to emit carbon dioxide (CO2) into the atmosphere.**
- Governments issue **carbon credits**, where **one credit equals 1,000 kilograms of CO2 emissions**.
- The idea is to control the total carbon released by limiting the number of carbon credits issued.
- Firms or individuals exceeding their emission quotas must buy additional credits from those who emit less than their allowance. This trading creates a financial incentive to reduce emissions.
- The **concept first emerged in the 1990s in the U.S.**, using a **cap-and-trade model** to regulate sulphur dioxide emissions.
- Now, carbon markets are expanding to include **carbon offsets**, where businesses pay for environmental projects like tree planting to compensate for their emissions.

Benefits of Carbon Markets:
- **Internalizing Externalities**: Emissions are a classic **externality**, where businesses do not bear the cost of the pollution they cause. Carbon markets impose a price on emissions, motivating companies to reduce their carbon footprint.
- **Market Efficiency**: Allowing the trading of credits ensures that firms with lower costs of reducing emissions take more action, optimizing resource allocation.
- **Improved Monitoring**: Technological advancements have enhanced the tracking and reporting of emissions, making the system more reliable.

Criticism and Challenges:
- **Manipulation of Supply**: Governments might issue **excessive credits**, reducing their price and failing to curb emissions effectively.
- **Lack of Incentives**: Firms may engage in **virtue signalling** by purchasing offsets without ensuring real emission reductions.
- **Voluntary Systems**: Large corporations often resist government-imposed budgets, preferring voluntary frameworks like the **Carbon Disclosure Project**.
- **Economic Impacts**: Critics argue that restricting carbon credits might slow economic growth.

How Carbon Markets Work?
- **Cap-and-Trade**: Governments set a cap on total emissions and issue credits accordingly. Companies that emit less can sell their unused credits to others.
- **Carbon Offsets**: Businesses pay for environmental initiatives, such as afforestation, to offset their emissions.
- **Price Determination**: Market forces of supply and demand decide the price of carbon credits.

Global Perspective and the Role of COP29:

- The ongoing **COP29 Climate Conference in Baku** has approved standards to establish an international carbon market, potentially operational next year.
  - COP stands for **Conference of the Parties** and it often refers to the **United Nations Framework Convention on Climate Change** (UNFCCC) international meeting focusing on climate.
- This move aims to harmonize global efforts to curb emissions and align with the **Paris Agreement**

Criticisms of Carbon Offsets:

- **Efficacy Concerns**: Some argue offsets are more about public image than actual impact.
- **Lack of Verification**: Ensuring that projects genuinely offset emissions remains a challenge.

Industry and Government Perspectives:

- Large corporations like ExxonMobil support market-based mechanisms over government controls, arguing for flexibility and cost-efficiency.
- Governments must balance environmental objectives with economic growth, navigating complexities in regulating and monitoring emissions.

Conclusion:

- **Carbon markets offer a promising tool for mitigating climate change by assigning economic value to carbon emissions.**
- However, their success depends on **robust regulation, transparency, and genuine commitment** from all stakeholders.
- By addressing the criticisms and refining the system, carbon markets can significantly contribute to achieving global climate goals.

9. Deepening India's Steps as a Key Space-Faring Nation

Context

- **India has embarked on an ambitious journey to expand its presence in outer space** over the next two decades.
- At the heart of this vision is the **development of reusable, heavy-lift rockets such as the Indian Space Research Organisation's (ISRO) Next Generation Launch Vehicle (NGLV).**
- To achieve strategic autonomy in space, **India must also leverage its private sector to develop parallel technologies,** ensuring a resilient and competitive space ecosystem.

The Evolution of India's Space Ambitions

- **Early Foundations: The 1960s to 1980s**
  - **India's initial foray** into space was **marked by modest objectives, largely focused on using space technology to address developmental challenges.**
  - The **launch of Aryabhata in 1975, India's first satellite**, symbolised the nation's commitment to self-reliance in space technology.
  - **Subsequent projects, such as the Satellite Instructional Television Experiment (SITE) and the INSAT series,** demonstrated the practical utility of satellites for education, weather forecasting, and communication.
  - **These efforts laid the groundwork for a robust space program** oriented toward socio-economic benefits.
- **The Growth Phase: The 1990s to 2000s**
  - **By the 1990s, India began to expand its capabilities**, shifting from being a technology user to a developer.
  - **The Polar Satellite Launch Vehicle (PSLV)** emerged as a reliable workhorse, capable of launching satellites into different orbits.
  - The **success of missions like Chandrayaan-1 in 2008, India's first lunar probe**, marked a turning point.

- o **Chandrayaan-1 not only confirmed the presence of water on the moon but also showcased India's ability** to execute complex interplanetary missions.
- **Towards Human Spaceflight and Exploration**
  - o The **2010s saw India aiming higher with missions like Mangalyaan**, the Mars Orbiter Mission, launched in 2013.
  - o **This mission, accomplished at a fraction of the cost of similar global projects**, demonstrated India's **engineering ingenuity and strategic foresight.**
  - o **As the first Asian nation to reach Mars' orbit, India firmly established itself among the elite group** of space powers.
  - o **Gaganyaan, aimed at sending Indian astronauts into space**, this initiative reflects India's aspirations to develop indigenous human spaceflight capabilities.
- **Strategic Autonomy and International Collaboration**
  - o As space increasingly becomes a domain of strategic importance, **achieving autonomy in space transportation and exploration is crucial.**
  - o At the same time, **ISRO has actively collaborated with international partners**, contributing to global projects while safeguarding its independent capabilities.
  - o **India's evolution as a space power reflects a careful balancing act**: leveraging global cooperation while building indigenous capacity.
  - o This **dual approach ensures that India remains competitive** while maintaining strategic independence.

The Promise of the NGLV
- **The NGLV represents a significant technological leap** for India.
- It **alleviates the engineering constraints of miniaturisation** and weight reduction by accommodating larger payloads, which dramatically expands the scope of space missions.
- Furthermore, **its partial reusability offers substantial cost savings**, aligning with global trends in rocket technology.
- In contrast to expendable rockets, **reusable systems require a portion of their fuel for controlled descent and recovery.**
- **While this slightly reduces payload capacity, the trade-off is justified by long-term economic benefits.**
- Reusability has become an industry standard, exemplified by the success of SpaceX's reusable Falcon 9 and the groundbreaking Starship rockets.

Immediate Needs and Challenges Faced by Indian Space Sector
- **Limitations of Current Rockets**
  - o India's current most powerful rocket, t**he LVM3 (Geosynchronous Satellite Launch Vehicle Mk III), has a payload capacity of 4,000** kg to the Geostationary Transfer Orbit (GTO).
  - o **This capacity, while sufficient for some missions, falls short when it comes to heavier payloads** required for advanced applications like large communication satellites or complex lunar missions.
  - o **For instance, India's next uncrewed moon mission will require two LVM3 r**ockets to assemble the payload in space, a time-consuming and complex process.
  - o **Similarly, the GSAT-N2 satellite, which weighed 4,700 kg, had to be launched aboard SpaceX's Falcon 9 rocket** due to the LVM3's payload limitations.
  - o **Such dependencies on foreign launch providers not only incur high costs** but also compromise strategic autonomy.
- **The Need for Heavy-Lift and Reusable Rockets**
  - o The **global space industry has rapidly transitioned to heavy-lift reusable rockets,** which provide significant cost savings and operational efficiency.
  - o **SpaceX's Falcon 9, for example, can carry up to 5,500 kg to GTO** with reusability and 8,300 kg as an expendable rocket.
  - o Meanwhile, **the Starship, SpaceX's latest innovation, boasts a payload capacity exceeding 21,000 kg to GTO and 100,000 kg to Low Earth Orbit (LEO),** while remaining fully reusable.

o These capabilities far surpass India's current offerings, underscoring the need for accelerated technological upgrades.

o **The absence of such advanced rockets in India means that the country cannot fully participate in or benefit from the rapidly growing commercial space market**, particularly in satellite launches and deep-space missions.

Strategies Towards Bridging the Gap

- **Collaborations for Launch Services**
  o In the short term, **partnering with international companies like SpaceX for critical heavy-lift launches can help India** bridge the gap.
  o However, this should be viewed as a stopgap measure to avoid long-term dependence.

- **Enhancements to Existing Rockets and Developing Reusable Technology**
  o Incremental upgrades to the LVM3 could help improve its payload capacity.
  o For example, **optimising propulsion systems or adopting advanced materials might allow the rocket to handle slightly heavier payloads**, providing temporary relief until the NGLV becomes operational.
  o **Initiatives to introduce partial reusability in current rockets, even in limited capacities, could significantly reduce costs and provide valuable experience** for future reusable systems.

- **Encourage Private Sector Engagement**
  o To bridge these gaps, **India must actively involve its private sector in developing heavy-lift, reusable rockets.**
  o The **Department of Space can issue contracts incentivising private companies to design and build their own rockets**, creating innovation and technical growth.
  o **This collaborative approach can leverage milestone-based funding** to ensure accountability and manage costs effectively.
  o **Although Indian private industry currently lacks expertise** in rocket technology, partnerships with foreign entities and the **acquisition of commercial rocket engines can accelerate progress.**
  o **The benefits of such an approach extend beyond immediate project outcomes, creating a robust ecosystem of innovation,** infrastructure, and technical capability.

- **Addressing High Development Costs and Safety and Reliability**
  o **Building advanced rockets requires significant investment in research**, infrastructure, and testing.
  o Ensuring efficient resource allocation and avoiding cost overruns is crucial.
  o **Human-spaceflight missions and interplanetary explorations demand extremely high safety standards.**
  o **Developing reliable rockets with the ability to consistently carry heavy payloads is a time-intensive process** that involves numerous test flights and iterations.

Conclusion

- **India stands at the cusp of a transformative era** in its space program.
- **The development of reusable, heavy-lift rockets** like the NGLV, **coupled with private sector collaboration, offers the potential to position India as a global leader** in space exploration.
- **By addressing current challenges** and developing a resilient industrial ecosystem, **India can ensure its ambitions in outer space are not only realized but sustained for decades to come.**

10. In Energy-Dependent World, the Issue of Food Security

Context

- As emphasised by the World Bank, **the intertwined crises of food insecurity and energy poverty present one of the most significant challenges** of the 21st century.
- **Both sectors face individual and systemic threats**, yet their interconnected nature magnifies the complexity of the problem and the agricultural sector, critical for human survival, **simultaneously contributes to and suffers from energy dependency and climate change.**

- Therefore, **it is imperative to explore the strain on food and energy systems, highlighting the economic and environmental vulnerabilities** they face, and **potential pathways toward a sustainable future.**

The Dual Strain on Food and Energy Systems
- **Impact of Climate Change**
  - Food production and energy systems are **increasingly strained by climate change, population growth, and systemic inequalities.**
  - **Agriculture consumes nearly 70% of global freshwater** resources and contributes over 20% of global greenhouse gas emissions.
  - This **sector's heavy reliance on fossil fuels for irrigation, mechanisation**, fertiliser production, and transportation **perpetuates environmental degradation.**
  - At the same time, **rising temperatures and erratic weather patterns disrupt agricultural output,** threatening the livelihoods of 2.5 billion people globally.
- **Geopolitical Challenges**
  - Similarly, **the energy sector faces geopolitical tensions**, outdated infrastructure, and a slow transition away from fossil fuels.
  - **Despite a $500 billion investment** in renewable energy in 2022, **short-term economic and geopolitical pressures have sustained high fossil fuel consumption.**
  - Nations such as the **United States, Brazil, and Guyana continue expanding oil and gas production,** exacerbating energy and food system vulnerabilities.

A Detailed Analysis of Agriculture's Fossil Fuel Dependency and Its Consequences
- **The Role of Fossil Fuels in Agriculture**
  - Mechanisation, irrigation systems, and transportation networks depend on oil, diesel, and coal-based electricity.
  - Additionally, **fertilisers, which are critical for boosting crop yields, are predominantly produced using natural gas.**
  - Approximately **80% of natural gas in agriculture is used as a feedstock for ammonia synthesis,** a key ingredient in nitrogen-based fertilizers, while **the remaining 20% powers the energy-intensive production process.**
- **Price Volatility and Food System Vulnerabilities**
  - The close link between energy prices and agricultural costs creates a cascade of vulnerabilities and **when fossil fuel prices rise, production costs for farmers increase dramatically.**
  - Fertiliser prices are **highly sensitive to natural gas costs**, for example, **geopolitical actions such as Russia's invasion of Ukraine in 2022 triggered spikes in global energy prices**, which reverberated through agricultural supply chains.
  - **Fertiliser costs surged, leading to increased food prices** and putting millions at risk of hunger, especially in low-income nations with limited resources to absorb such shocks.
  - **For countries like India, which imports 60% of its diammonium phosphate (DAP)** fertilisers, this **led to delays during critical cropping seasons, undermining food security** and agricultural productivity.
- **Environmental Consequences of Fossil Fuel Dependency**
  - Fertiliser production and transportation are **major sources of greenhouse gas emissions.**
  - The **heavy use of synthetic fertilisers leads to nitrous oxide emissions**, a potent greenhouse gas, and causes soil degradation and water pollution through runoff.
  - **Mechanised farming practices reliant on fossil fuels worsens these issues**, contributing to a vicious cycle of environmental harm and reduced long-term agricultural productivity.

Inequities in Energy Access and their Impact
- The unequal access to energy systems **disproportionately affects low-income nations**, where unreliable power grids and limited resources hinder agricultural productivity.

- **In sub-Saharan Africa**, for instance, **fertiliser usage per hectare remains far below the global average**, contributing to chronic food insecurity.
- **Despite spending $1.9 billion on fertilizer imports in 2021**, double the expenditure of 2016, many **African nations remain trapped in cycles of low productivity** and high dependency on imports.
- Furthermore, **the transition to renewable energy remains uneven.**
- **High-income countries installed 83% of new renewable capacity in 2022, leaving low-income nations dependent on outdated,** carbon-intensive systems.
- While solutions like solar-powered irrigation and biomass energy hold promise for transforming agriculture, their **high costs and inadequate infrastructure limit widespread adoption in vulnerable regions.**

Competing Demands on Agriculture and Economic and Environmental Costs of Inaction
- **Competing Demands on Agriculture**
  o In addition to feeding a growing global population, **agriculture faces the added responsibility of supporting the energy transition through biofuel production.**
  o This **dual role often pits food security against energy needs**, as biofuel cultivation consumes vast land and water resources.
  o **With nearly 12% of the global population experiencing hunger**, prioritising energy production over food **raises ethical questions.**
- **Economic and Environmental Costs of Inaction**
  o **Ensuring basic caloric needs for the world's most vulnerable populations would require $90 billion annually until 2030**, while transforming global food systems could cost $300 billion to $400 billion annually, just 0.5% of global GDP.
  o However, **for low-income nations, these figures are staggering**, often surpassing 95% of GDP in some cases.
  o **Food insecurity could cost the global economy trillions in lost productivity** and adverse health outcomes, **while climate-induced energy disruptions threaten to destabilise entire regions.**
  o For example, **Africa's mineral wealth, critical for renewable energy technologies, is often extracted without benefiting local economies**, perpetuating poverty, and underdevelopment.

Way Forward to a Sustainable Future
- **A Call for Inclusive Solutions**
  o Despite record investments in renewable energy, **the expansion of fossil fuels continues unabated, compounding environmental and economic costs.**
  o To address these intertwined crises effectively, **clean energy solutions must overcome structural barriers to inclusivity, ensuring that vulnerable communities are not left behind.**
  o **Renewable energy technologies like solar-powered irrigation and decentralised biomass systems offer opportunities** for sustainable agricultural transformation but **require targeted investments and infrastructure development.**
- **Reimagining Agriculture for a Sustainable Future**
  o The **twin crises of food and energy insecurity demand a fundamental shift** in global priorities.
  o **Agriculture must be reimagined as a cornerstone of sustainable development** rather than merely a source of sustenance.
  o **Achieving this vision requires significant investments in renewable energy, equitable resource distribution**, and the inclusion of marginalized communities in decision-making processes.
- **Breaking the Fossil Fuel Dependency**
  o Addressing agriculture's reliance on fossil fuels **requires a multi-faceted approach. Transitioning to renewable energy sources is crucial.**
  o Technologies like solar-powered irrigation systems, wind-driven farm equipment, and decentralised biomass energy production hold the potential to revolutionise agricultural practices.

o **For instance, solar-powered pumps can reduce the dependence on diesel for irrigation**, while biogas plants can convert agricultural waste into sustainable energy.

Conclusion
- **Agriculture's dependence on fossil fuels is a pressing issue that threatens food security,** exacerbates economic inequalities, and accelerates environmental degradation.
- As the clock ticks, **the question remains: will the world rise to meet this moment of unprecedented challenge and opportunity?**
- **By addressing food and energy insecurity** as interconnected priorities, **humanity can chart a course toward a more equitable and sustainable future.**

11. RBI's Approach to De-Dollarization and Diversifying Risks

Introduction:
- RBI has clarified its stance on de-dollarization, stating that its recent policies are aimed at diversifying risks rather than completely moving away from the dollar.
  - o **De-dollarization refers to reducing dependence on the US dollar in international trade and reserves**.
  - o It is often driven by geopolitical tensions and the desire for economic independence.
- This approach balances **global economic realities while safeguarding India's financial stability.**
- The clarification came days after US President-elect Donald Trump threatened "100 per cent tariffs" against BRICS countries if they sought to reduce reliance on the US dollar in international trade.

Key Highlights:
- **Diversification over De-Dollarisation:**
  - o **RBI Governor Shaktikanta Das** emphasized that measures like local currency trade agreements and Vostro accounts aim to reduce dependency on the US dollar but do not intend to eliminate its role entirely.
    - ▪ **Vostro accounts are bank accounts held in India by a foreign bank in Indian rupees**.
    - ▪ They facilitate trade in local currencies and reduces reliance on third-party currencies like the dollar.
  - o The aim is to mitigate risks stemming from over-reliance on a single currency for trade and reserves.
- **Central Banks' Gold Buying Spree:**
  - o Central banks globally, including the RBI, are purchasing gold to diversify reserves. In 2022, global central banks acquired a record 1,136 tonnes of gold, followed by 1,037 tonnes in 2023.
  - o **RBI added 27 tonnes of gold in October 2024 alone, the largest among central banks during that period**.
  - o The shift to gold is driven by uncertainties, such as the **Ukraine war** and the fear of secondary sanctions, especially in countries like **Russia** and **China**.
- **Impact of Dollar Dominance:**
  - o The dollar's share in global foreign reserves has seen a gradual decline, partially offset by the **rise of the Chinese yuan**.
  - o Emerging markets like India are seeking alternatives to dollar reliance due to the geopolitical and economic risks associated with the currency's dominance.
- **Domestic Currency Trade:**
  - o India is encouraging trade in domestic currencies with partners like Russia and the UAE to partially de-risk its trade ties.
  - o However, international trade in rupees has been limited due to India's trade deficits with most countries except the US.

Geopolitical Context:
- **BRICS and Currency Discussions:**

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- BRICS nations have deliberated on creating a shared currency but face challenges due to their geographical and economic diversity.
- India has resisted using the Chinese yuan for Russian oil imports despite its growing acceptance globally, citing economic sovereignty concerns.
- **Challenges in India's Neighbourhood:**
  - Surging oil prices and declining dollar reserves have caused social and political unrest in **South Asian countries like Sri Lanka, Pakistan, and Bangladesh.**
  - While India has maintained robust reserves, it remains vigilant about the dollar's volatility.

Conclusion:
- **India's cautious approach to managing dollar reliance reflects a strategic balance between mitigating risks and maintaining global trade stability**.
- Through increased gold reserves and efforts to promote the rupee in international trade, the RBI is navigating a complex economic landscape while safeguarding national interests.
- However, challenges like **trade deficits and high transaction costs in domestic currency** trade remain barriers to reducing dollar dependence entirely.

## 12. Evaluating India's Production-Linked Incentive (PLI) Scheme

Why in News?
While some sectors have shown encouraging results under the **Production-Linked Incentive (PLI) scheme, others lag in meeting targets, prompting reviews and potential adjustments.**

What is the PLI Scheme?
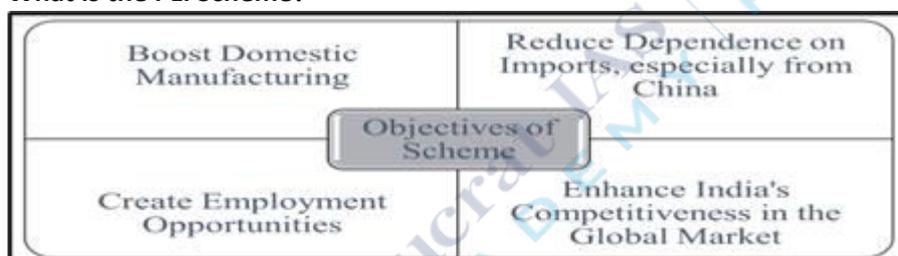
- **About:** The PLI scheme was **launched** (in March, 2020) **to boost India's domestic manufacturing base and enhance its global supply chain contribution**.
- **Objective:** Covering 14 sectors, the scheme aims to create **significant employment opportunities and drive industrial capital expenditure (capex)**.
- **How does it work?**
  - Under the PLI scheme, **eligible companies receive financial incentives** based on their incremental sales from products manufactured in India.
  - These incentives **encourage companies to invest** in upgrading their manufacturing capabilities, adopting modern technologies, and expanding their production capacities.
- **How is PLI different from other traditional subsidies?**
  - **Only limited sectors are eligible:** The scheme has the potential to attract maximum investments and scale rapidly to provide the maximum returns in terms of incremental production, employment, and export.
  - **Time-bound pre-committed levels of investment and productions:** Hence, cannot be called a subsidy scheme.
  - **Focus on supporting upcoming technologies:** That can be commercialised at a large scale like advanced chemistry cell batteries, electronic and technology products.

Sectors Under the PLI Scheme
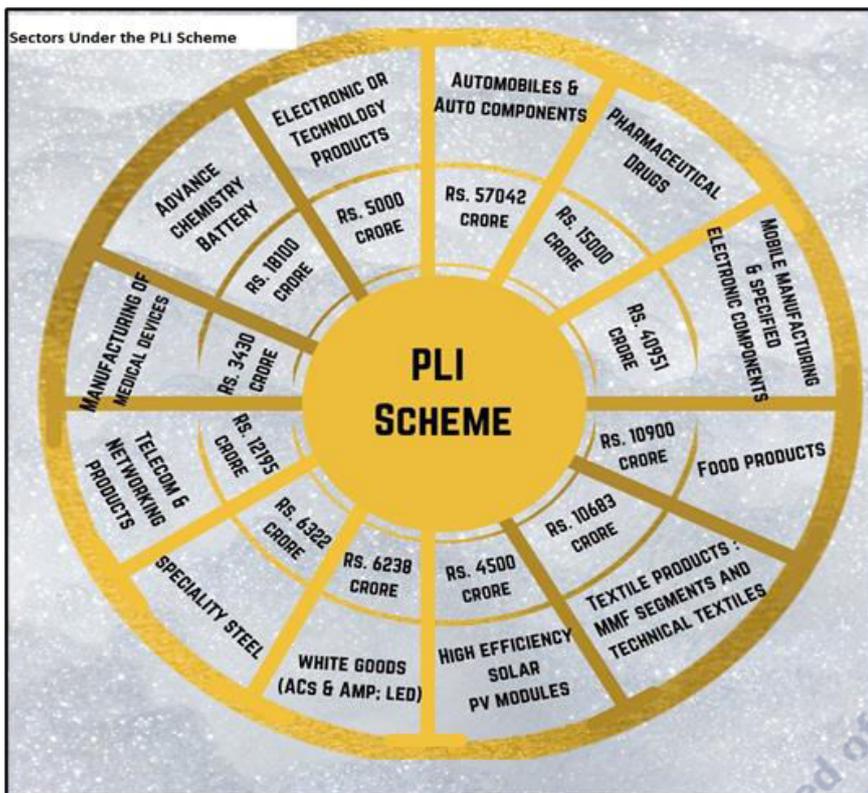
Evaluating Progress, Challenges and Potential of the PLI Scheme:

- **Mixed progress across sectors:**
  - **Sectors lagging in employment generation:**
    - **Textiles, solar modules, IT hardware, automobiles**, advanced chemical cells (ACC), and specialty steel have seen relatively slow progress in creating jobs.
    - Initial challenges stem from the need to build domestic manufacturing capabilities from scratch.
  - **Successful sectors:**
    - **Food processing and mobile phone manufacturing** have exceeded expectations.
    - **For instance**, smartphone exports reached $15 billion in 2023-24, driven by companies like Apple expanding assembly operations in India.

Initial challenges and emerging benefits:

- **Challenges:**
  - **Developing manufacturing industries from scratch** in certain sectors.
  - Stringent eligibility criteria, reliance on imported machinery, and high tariffs have been deterrents.
  - **Time-consuming commissioning processes** in sectors like solar modules and ACC, which require 1.5–3 years to set up.
- **Emerging benefits:**
  - **Sectors like mobile manufacturing show a ripple effect,** with large companies like Apple spurring ancillary industries and creating opportunities for smaller suppliers.
  - For instance, **Apple now sources components from 14 Indian suppliers** compared to none prior to the PLI scheme.
- **Economic potential:** According to CRISIL, the PLI scheme **could drive ₹3-3.5 lakh crore in industrial capital expenditure over its duration**, contributing 8–10% of total capex in key sectors over the next 3–4 years.
- **Critical perspectives:** Critics argue that the PLI scheme may function as a subsidy without guaranteeing long-term competitiveness once incentives end.
- **Way ahead:**

- o **Sectoral adjustments:** IT hardware recently received an upgraded outlay. Renewals or adjustments are under consideration for sectors like textiles and drones.
- o **Potential revisions:** Revising eligibility criteria and increasing support in underperforming sectors. **Emphasising employment-linked outcomes in sectors with slow initial traction**.

Conclusion:
- Challenges in underperforming sectors highlight the **need for fine-tuning policies to achieve long-term goals** of industrial growth, employment, and competitiveness.
- As the government recalibrates the framework, **sustained engagement with stakeholders and addressing structural bottlenecks** will be key to realising the scheme's full potential.

PRELIMS BOOSTER (THE HINDU, INDIAN EXPRESS & PIB)

2ND DECEMBER

1. Tungsten:

Tungsten is a **chemical element with the symbol W, and atomic number 74**. Classified as a transition metal, **Tungsten is a solid at room temperature**. It is a naturally occurring element. It **occurs in rocks and minerals combined with other chemicals, but never as a pure metal**. It is found in nature in mineral forms like **wolframite and scheelite**. Elemental tungsten is a white to steel gray metal (depending on the purity) that can be used in pure form or mixed with other metals to make alloys.

Features:

➢ One of the **densest metals, with a density of 19.3 g/cc**
➢ **Highest melting point** of all metals at 3410 °C
➢ **Lowest vapor pressure of all metals** with 4.27 Pa at 3410 °C
➢ **Highest tensile strength of all metals** over 1650 °C

Uses:

Tungsten alloys tend to be **strong and flexible, resist wear, and conduct electricity well.** Tungsten is used in products such as x-ray tubes, light bulbs, high-speed tools, welding electrodes, turbine blades, golf clubs, darts, fishing weights, gyroscope wheels, phonograph needles, bullets, and armor penetrators. It is also **used as a catalyst to speed up chemical reactions.** Chemical compounds of tungsten are used for many purposes. Cemented tungsten carbide is a hard substance used to make grinding wheels and cutting or forming tools. Other tungsten compounds are used in ceramic pigments, as fire retardant coatings for fabrics, and as color-resistant dyes for fabrics.
Major producers: China (dominates global production), Vietnam, Russia, and North Korea.
It has been classified as a **Critical Mineral by the Government of India.**

2. Notre-Dame Cathedral:

It is a **cathedral church located in Paris, France**. It is the **most famous of the Gothic cathedrals of the Middle** Ages and is distinguished for its size, antiquity, and architectural interest. The **Notre Dame Cathedral with its sculptures and stained-glass windows show the heavy influence of naturalism**, unlike that of earlier Romanesque architecture.

Construction:

The cathedral was initiated by **Maurice de Sully, bishop of Paris**. The **foundation stone was laid by Pope Alexander III in 1163, and the high altar was consecrated in 1189.** The choir, the western facade, and the nave were completed by 1250, and porches, chapels, and other embellishments were added over the next 100 years. It **has been the setting for many historical events, notably, the coronation of Emperor Napoleon Bonaparte in 1804,** the marriages of several Kings of France, including Francis II in 1558 and Henry IV of France in 1572. On April 15, 2019, a devastating fire engulfed Notre-Dame, destroying the roof and the iconic spire. It is a **UNESCO World Heritage Site.**

3. Bromalites:

Bromalites are fossil traces of organisms, consisting of material from their digestive system. They are **the group of ichnofossils that record the consumption, processing, and elimination of material through digestive systems**. Each main stage of processing has been ascribed to distinct bromalite subgroups, with little evidence for transitions between these stages. **The most famous bromalites are fossilized feces, also known as coprolites**. However, other types are recognised, including: **regurgitalites (fossilised remains of vomit or other regurgitated objects such as owl pellets); cololites (intestinal contents); and gastrolites (stomach contents)**. Bromalites provide behavioural data including predation, scavenging, and vomiting. They are important indicators of dietary habits and potential predator-prey relationships; therefore, they largely enhance our comprehension of trophic interactions. **Bromalites are often studied alongside other trace fossils to reconstruct ancient ecosystems.**

4. C-PACE (Centre for Processing Accelerated Corporate Exit):

It has been set **up to centralise the process of striking off companies from the MCA Register**. C-PACE is in

operation through the Registrar of Companies (RoC) for the purposes of exercising functional jurisdiction of processing and disposal of applications. It will work under the **supervision of the Director General of Corporate Affairs (DGCoA)**. It was established to facilitate and speed up the voluntary winding up of companies to less than six months with process re-engineering. It is **part of the Ministry of Corporate Affairs' efforts towards ease of doing business and ease of exit for companies.**

Location: It is located at the Indian Institute of Corporate Affairs in Gurgaon.

Significance of C-PACE: It will reduce the burden on the registry and provide stakeholders with hassle-free filing, timely and process-bound striking off of their company's names from the register.

Rules to remove company from the Registrar of Companies

Section 248 of the Companies Act provides for the removal of the name of the company from the RoC if it is not carrying on any business or operation for a period of two immediately preceding financial years and has not made any application within the said period for obtaining the status of a dormant company under Section 455.

5. WOH G64 Star:

It is the **massive star that has been imaged with remarkable sharpness by the European Southern Observatory's Very Large Telescope Interferometer (ESO's VLTI).** It dwells in the Large Magellanic Cloud, a dwarf or satellite galaxy that orbits our Milky Way, which also happens to be one of the closest galaxies to us. It was **discovered in the 1970s by Bengt Westerlunds, Olander, and Hedin.** Incidentally, the WOH in its name is the acronym for the names of its three discoverers. The star is believed to be around 1,60,000 light years away from Earth. It is **classified as a red supergiant owing to its size, which is roughly 2,000 times that of the Sun**. The new photo has revealed that WOH G64 is entering the last stages of its life. In recent years, the star has blown off its outer layer, and it is now surrounded by wreaths and arcs of gas and dust.

6. What are Magellanic Clouds?

These are irregular galaxies that share a gaseous envelope and lie about 22° apart in the sky near the south celestial pole. They are **comprised of two irregular galaxies, the Large Magellanic Cloud(LMC) and the Small Magellanic Cloud (SMC), which orbit the Milky Way** once every 1,500 million years and each other once every 900 million years. These companion galaxies were named for the **Portuguese navigator Ferdinand Magellan**, whose crew discovered them during the first voyage around the world (1519–22). **Magellanic Clouds were formed at about the same time as the Milky Way Galaxy, approximately 13 billion years ago**. They are presently captured in orbits around the Milky Way Galaxy and have experienced several tidal encounters with each other and with the Galaxy. They contain numerous young stars and star clusters, as well as some much older stars.

7. AGNI WARRIOR:

It is a **joint military exercise between the Indian Army and Singapore Armed Forces**. It witnessed participation by the Singapore Armed Forces contingent comprising personnel from the Singapore Artillery and the Indian Army contingent personnel from the Regiment of Artillery. **The aim of XAW-2024 was to maximise mutual understanding of drills and procedures to achieve jointness as a multinational force under the United Nations Charter**. The exercise showcased joint firepower planning, execution and use of New Generation Equipment by the Artillery of both Armies. **The exercise involved extensive joint preparation, coordination, understanding of each other's capabilities, procedures and evolution of common interface between Indian and Singapore Artillery procedures.** It marked the culmination of successful training by Singapore Armed Forces troops exposing them to intricacies of Fire Power planning. Both sides utilised niche technologies during the exercise and exchanged best practices as part of the joint training.

8. Ramappa Temple

The Union Government has approved loans under the Special Assistance to States/Union Territories for Capital Investment (SASCI) scheme to develop Ramappa Region Sustainable Tourism Circuit. It is **also known as the Rudreshwara temple, is a Kakatiya style Hindu temple dedicated to the god Shiva, located in Telangana.**

Patronage: The **medieval Deccan Ramappa Temple which dates back to 1213 AD, was built by the patronage of the Kakatiya ruler Kakati Ganapathi Deva** under the authority of his Chief Commander Rudra Samani.

The **temple got its name Ramappa because of its chief sculptor Ramappa**. Ramappa Temple is probably the only temple in India that is named after the architect.

Architectural features:

Sandbox technique: The temple construction was done using the sandbox technique. This **mix acts as a cushion in case of earthquakes.** The temple's pillars produce musical notes. In 2021, the temple was inscribed as a UNESCO World Heritage Site as **"Kakatiya Rudreshwara (Ramappa) Temple, Telangana".**

DECEMBER 3

1. Varkala cliff:

Location: It is a beautiful natural formation located in **Varkala, a coastal town in Thiruvananthapuram district of Kerala**. The cliff, including both northern and southern ones, covering a total distance of 3 km, exposes the sedimentary rock formation of the Mio-pliocene Age. **Varkala is the only place on the West Coast of India where sediments in the Mio-Pliocene age (13 lakh to 2.5 crore years ago) had been exposed**. The Papanasam Beach, located at the base of the cliff, is revered for its natural springs and believed to have therapeutic properties. It is a crucial aquifer and natural water harvesting system for coastal communities, hosted unique biodiversity in its microhabitat, and supported underwater reefs essential for local fishing communities. It is the **27th National Geological Monument in the country and the second in the State after the Angadipuram Laterite.**

2. Key facts about the Geological Survey of India

It was **set up in 1851 primarily to find coal deposits for the Railways.** Over the years, it has grown into a repository of geo-science information required in various fields in the country. Its main role includes providing objective, impartial and up-to-date geological expertise and geoscientific information of all kinds, with a focus on policy-making decisions, and commercial and socio-economic needs. It is headquartered in Kolkata and has six regional offices located at **Lucknow, Jaipur, Nagpur, Hyderabad, Shillong and Kolkata**. Every state has a state unit. It is an **attached office to the Ministry of Mines.**

3. Urban Infrastructure Development Fund:

It was established through the use of priority sector lending shortfall. It will **be used by public agencies to create urban infrastructure in tier-2 and tier-3 cities**. It aims to supplement the efforts of the State Governments / UTs for urban infrastructure development works implemented through Public/ State Agencies, Municipal Corporations and Urban Local Bodies, by providing a **stable and predictable source of financing for providing basic services like Sewerage and Solid Waste Management, Water Supply and Sanitation**, construction and improvement of drains/ storm water drains, etc. It is **managed by the National Housing Bank**. The initial corpus for this Fund is ₹10,000 crore. **It is established on the lines of the Rural Infrastructure Development Fund (RIDF)**. States will be encouraged to leverage resources from the grants of the 15th Finance Commission, as well as existing schemes, to adopt appropriate user charges while accessing the UIDF. It currently covers 459 tier-2 cities and 580 tier-3 cities.

UIDF Loans:

The **interest rate on UIDF loans has been kept at Bank Rate minus 1.5 per cent**. The loan (Principal) will be repayable in five equal annual instalments within seven years from the date of draw, including a moratorium period of two years. Interest will be payable on a quarterly basis.

4. Madhav National Park:

Location: It is located in the **State of Madhya Pradesh**. It is situated on the northern fringe of the Central Highlands of India forming a part of the **Upper Vindhyan Hills** inter-mixed with plateaus and valley sections.

Lakes: Sakhya Sagar and Madhav Sagar are the two lakes in the southern part of the park, providing the

aquatic biodiversity and lifeline for the terrestrial species.

Rivers: The drainage pattern is towards north and northeast in the northern area of the park forming catchment of Amarnadi. The park area forms catchment of the Sind river which flows along the eastern boundary of the park. The eastern part of the park has sedimentary rocks of Vindhyan system, which are mostly sandstone, shale and limestones.

Vegetation: The forests of the park fall within the category of Northern tropical dry deciduous mixed forests as well as Dry Thorn Forests typical of North – Western Madhya Pradesh.

Flora: Kardhai, Salai, Dhaora and Khair. The understory comprises almost entirely of Ber, Makor and Karonda. The jamun and mahua are found along the nullahs.

Fauna: Nilgai, Chinkara and Chowsinga and Deer including Chital, Sambar and Barking Deer. Animals like the Leopard, Wolf, Jackal, Fox, Wild Dog etc.

5. CINBAX:

It is **conducted between the Indian Army and the Cambodian Army.** It is **aimed to conduct of a joint Counter Terrorism (CT) operations**. It will focus on discussions pertaining to establishment of Joint Training Task Force for Intelligence, Surveillance and Reconnaissance besides planning of operations in CT environment. **The exercise will also involve discussion on information operations, cyber warfare, hybrid warfare, logistics and casualty management, HADR operations**. It will be conducted in three phases. The exercise will also showcase weapons and equipment of the Indian origin **promoting 'Atmanirbharta' and indigenous capabilities in defence production.**

6. Solar Storm:

A solar storm is a sudden explosion of particles, energy, magnetic fields, and material blasted into the solar system by the Sun.

What causes a solar storm?
The sun's tangled magnetic fields get twisted up as the Sun rotates — with its equator rotating faster than its poles. Solar storms typically begin when these twisted magnetic fields on the Sun get contorted and stretched so much that they snap and reconnect (in a process called magnetic reconnection), releasing large amounts of energy. These powerful eruptions can generate any or all of the following:

- ➢ a **bright flash of light called a solar flare**
- ➢ a **radiation storm**, or flurry of solar particles propelled into space at high speeds
- ➢ an enormous cloud of solar material, called a **coronal mass ejection**

Effects on Earth:
When **directed toward Earth, a solar storm can create a major disturbance in Earth's magnetic field, called a geomagnetic storm, that can produce effects such as radio blackouts, power outages, and beautiful auroras**. They do not cause direct harm to anyone on Earth, however, to our planet's magnetic field and atmosphere that protect us from the worst of these storms.

7. RS-28 Sarmat:

It is a **liquid-fueled intercontinental ballistic missile developed by Russia.** It is named after the Sarmatian people of the fourth and fifth century BC. It has also been **referred to in the West as the "Satan II".**
Features:
It is a **three-stage, liquid-fueled missile with a range of 18,000 km**. It has a launch weight of 208.1 metric tons. The missile is 35.3 meters long and 3 meters in diameter. **Designated a "heavy" ICBM, the Sarmat can carry a 10-ton payload and can load a wide variety of warhead options.** It can reportedly load up to 10 heavy nuclear warheads, 16 smaller ones, a combination of warheads and countermeasures, or hypersonic boost glide vehicles. It is designed to elude anti-missile defence systems with a short initial boost phase, giving enemy surveillance systems a narrow window to track it down.

8. Vadhavan Port:

The **Vadhavan Port will be developed as an all-weather Greenfield deep draft major port in Vadhavan, Palghar District, Maharashtra**. The project will be implemented by **Vadhavan Port Project Limited (VPPL),** a special purpose vehicle (SPV) formed by Jawaharlal Nehru Port Authority (JNPA) and Maharashtra Maritime Board (MMB) with a shareholding of 74% and 26%, respectively. **Scheduled to be finished by 2034, it is projected to be among the top 10 ports in the world.** The port will comprise nine container terminals, each 1000 meters long, four

multipurpose berths, including the coastal berth, four liquid cargo berths, a Ro-Ro berth, and a Coast Guard berth. **By 2029, four terminals will be completed and five terminals will be added by 2034**. The Project will create a cumulative capacity of 298 million metric tons (MMT) per annum, including around 23.2 million TEUs (twenty-foot equivalents) of container handling capacity. It **will also aid EXIM trade flow through IMEEC (India Middle East Europe Economic Corridor) and INSTC (International North South Transportation Corridor).**

9. Anthrax:

Anthrax is a rare but serious illness caused by a spore-forming bacterium, **Bacillus anthracis**. It's **found naturally in soil around the world and commonly affects livestock and wild animals**. The bacteria produce spores that can live in the ground for years.

Transmission:

Livestock and wild animals can become infected when they breathe in, eat, or drink bacterial spores in contaminated soil, plants, or water. **People usually get sick with anthrax if they come in contact with infected animals or contaminated animal products**. People can also get infected directly by the spores through food, water or soil. Anthrax isn't transmitted from person to person but the skin lesions can be contagious though contact. **Infection in humans most often involves the skin, gastrointestinal tract, or lungs.** The disease manifests in three forms depending on the route of infection: cutaneous, gastrointestinal, and inhalational.

Symptoms: Depending on the type, symptoms include: Chest pain and trouble breathing. Fever and profuse sweating. Headache or muscle aches. Itchy blisters or bumps. Skin ulcer (sore) with a black center. Nausea and vomiting, abdominal pain, and bloody diarrhea. Swollen lymph nodes.

Treatment: Antibiotic treatment is effective. **Doxycycline, amoxycillin, ciprofloxacin, etc are generally used for the treatment**. Vaccination against anthrax is only recommended for at-risk individuals, such as those working in anthrax-endemic areas.

10. About HIV (Human Immunodeficiency Virus)

It attacks the immune system by targeting white blood cells, making the body more vulnerable to infections and diseases. **AIDS (Acquired Immunodeficiency Syndrome) is the most advanced stage of HIV infection.** HIV is transmitted through body fluids such as **blood, breast milk, semen, and vaginal fluids**, but not through casual contact like kisses or hugs. It can also be passed from mother to child. HIV can be prevented and managed with antiretroviral therapy (ART).

11. About UN Peacebuilding Commission

Established in 2005, the UNPBC is an intergovernmental advisory body that supports peace efforts in conflict-affected countries. It brings together key stakeholders, including UN agencies, regional organizations, and civil society, to develop comprehensive strategies for **post-conflict recovery and peace building**.

12. Border Security Force (BSF)

About

Establishment: On **December 1, 1965**, in the wake of the 1965 India-Pakistan war.

Administrative Control: Ministry of Home Affairs (MHA).

Deployment: Deployed at **Indo-Pakistan International Border**, Indo-Bangladesh International Border and Line of Control (LoC), along with Indian Army and in Anti-Naxal Operations.

Officials: Although, the **BSF has its own cadre of officers but its head, designated as a Director-General (DG),** since its raising has been an officer from the Indian Police Service (IPS).

Logo and motto: The Logo of BSF has two spikes of grains, embracing the National Emblem of India and the typeface BSF. The **motto of BSF "DUTY UNTO DEATH" is placed at the bottom.**

13. About Notifiable Disease

Notifiable diseases are those that healthcare providers are legally obligated to report to public health authorities. This allows for surveillance, outbreak detection, and timely intervention. Other notifiable diseases in India include: **AIDS, Hepatitis, Dengue, Cholera etc**. The World Health Organization's International Health Regulations (IHR) require countries to report certain disease outbreaks and public health events to the WHO.

4 DECEMBER

1. Nazca Lines:

Nazca Lines are a **group of geoglyphs**, or large designs made on the ground by creators using elements of the landscape such as stones, gravel, dirt or lumber. These are locat**ed in the arid Peruvian coastal plain, some 400 km south of Lima.** The Nazca Lines were discovered by hikers in the mid 1920s and later on **Peruvian archaeologist Toribio Mejia Xesspe studied them systematically in 1926**. These are believed to be the **greatest known archaeological enigma,** owing to their size, continuity, nature and quality. They depict creatures from both the natural world and the human imagination. They include animals such as the spider, hummingbird, monkey, lizard, pelican and even a killer whale. Ancient artisans also depicted plants, trees, flowers and oddly shaped fantastic figures, as well as geometric motifs, such as wavy lines, triangles, spirals and rectangles. The vast majority of the lines date from 200 B.C. to A.D. 500, to a time when a people referred to as the Nazca inhabited the region. The earliest lines, created with piled up stones, date as far back as 500 B.C. The **Lines were declared a World Heritage Site by UNESCO in 1994.**

What are Geoglypgs?
Geoglyphs are motifs created on the ground by manipulating surface stones, soil, or gravel.

2. Asia-Oceania Meteorological Satellite Users' Conference (AOMSUC):

The **first AOMSUC was held in Beijing, China, in 2010**. Since then, it has been hosted annually in various locations across Asia-Oceania. The AOMSUC has become a premier event for meteorologists, earth scientists, satellite operators, and students from across the region and the globe. **This year's conference is hosted by the India Meteorological Department (IMD), Ministry of Earth Sciences**, and it will feature high-quality oral and poster presentations, panel discussions, and a training workshop focused on applying current satellite data for meteorological and climatologically applications.

The conference aims to:
- Promote the **importance of satellite observations**
- Advance satellite remote sensing science
- Provide a platform for **dialogue and collaboration between satellite operators and users**
- Inform the community about the current status and future plans of international space programs

- Encourage the **development of new technologies for weather satellite sensing**
- Engage young scientists in the field

3. Exercise Harimau Shakti:

It is a **joint military exercise conducted between India and Malaysia**. Indian contingent comprising personnel is being represented by a Battalion of MAHAR Regiment. It is an **annual training event conducted alternatively in India and Malaysia. Last edition was conducted in November 2023 at Umroi Cantonment in Meghalaya, India.** Aim of the Joint Exercise is to enhance joint military capability of both sides to undertake counter insurgency operations in jungle terrain under **Chapter VII of the United Nations Mandate**. The exercise will focus on operations in the jungle environment. **The 2024 exercise will be conducted in two phases**. The fi**rst phase will be focused on cross training between both the Armies i**ncluding lectures, demonstrations, and practices of various drills in jungle terrain. **In the final phase both the Armies will take active part in a simulated exercise,** wherein troops will execute various drills including Anti-MT Ambush, Occupation of Harbour, Carrying out Recce Patrol, Ambush and an Attack on area taken over by the terrorists.

Significance: It will enable both sides to share best practices in Tactics, Techniques and Procedures of conducting joint operations. It will facilitate developing inter-operability, bonhomie and camaraderie between the two armies.

4. National Housing Bank (NHB):

It is an apex agency established to promote housing finance companies (HFCs) in India. It is **an All-India Financial Institution (AIFI) wholly owned by the Government of India (GoI).** It supervises HFCs, while regulation of HFCs is with the Reserve Bank of India (RBI).

Formation:
The **National Housing Policy, 1988, envisaged the setting up of NHB as the apex-level institution for housing**. In pursuance of the above, NHB was set up on July 9, 1988, under the **National Housing Bank Act, 1987**. RBI contributed the entire paid-up capital. The **broad functions of NHB as a part of its objective of building a strong, healthy, cost-effective, and viable**

Housing Finance System include: Supervision and grievance redressal regarding HFCs, Financing And Promotion and Development.

NHB RESIDEX: It is the country's first official housing price index (HPI). It captures movements in the prices of residential real estate prices.

5. PRAGATI platform:

It is a **multi-purpose and multi-modal platform that is aimed at addressing common man's grievances and simultaneously monitoring and reviewing important programmes and projects of the Government of India as well as projects flagged by State Governments**. It is also a robust system for bringing e-transparency and e-accountability with real-time presence and exchange among the key stakeholders. **The platform was launched on March 25, 2015**. It is a **three-tier system (PMO, Union Government Secretaries, and Chief Secretaries of the States).** The Prime Minister holds a monthly programme interacting with the Government of India Secretaries and Chief Secretaries through video-conferencing enabled by data and geo-informatics visuals. **The system has been designed in-house by the PMO team with the help of the National Informatics Center (NIC).** The PRAGATI platform uniquely bundles three latest technologies: Digital data management, video conferencing, and geospatial technology.

6. Chronic Pulmonary Aspergillosis (CPA):

It is a fungal infection of the lungs, caused by **Aspergillus, a common type of mold.** Aspergillus is commonly found in households, workplaces, and public spaces, as well as in outdoor areas. People who have chronic lung conditions, such as emphysema, bronchitis, or tuberculosis, are most at risk of developing CPA. **CPA is not contagious. It cannot be passed from person to person.**

Symptoms: CPA doesn't always cause symptoms in the early stages. When symptoms do occur, they can vary from person to person. The most common symptom of CPA is coughing up blood. Other symptoms can include: unintentional weight loss, fatigue, shortness of breath and wheezing

Treatment: For most people, **CPA is a lifelong condition, and long-term management is needed**. However, for a small number of people, CPA may sometimes resolve completely. Antifungal medications are the most common treatment for CPA. **Surgery is an option to remove the fungal mass.** This is done when CPA causes bleeding in the lungs.

7. The Great Stupa of Sanchi

A **stupa is a Buddhist commemorative monument usually containing sacred relics of the Buddha or other saints**. The archetypal stupa is a hemispherical structure, whose origins can be traced to pre-Buddhist burial mounds found in India.

Established: The stupa was commissioned in the third century BCE by Emperor Ashoka of the Maurya dynasty, who embraced Buddhism after his conversion following the Kalinga War. It was constructed to house relics of the Buddha and to serve as a center for Buddhist worship.

Structure: The **Great Stupa is a hemispherical dome made of stone and brick**, with a central structure that is a large, raised platform containing the relics of the Buddha. It is **topped by a 'harmika'** to hold the triple umbrella, or 'chhatraveli', which represents the **three jewels of Buddhism – the Buddha, the Dharma, and the Sangha**. Above the dome, there is a pillar-like structure called the chatra, which is a symbol of the Buddha's presence and enlightenment.

8. Rabi Crops

Sowing Period: Around October, during the Retreating Monsoon and Northeast Monsoon.
Harvesting Period: April to May (summer season).
Climate Requirements: Warm climate for seed germination. Cold climate for crop growth.
Rainfall: Not heavily dependent on rainfall; irrigation is commonly used.
Major Crops: Wheat, gram (chickpeas), peas, barley, mustard.

Kharif Crops:
Sowing Period: During the Southwest Monsoon (end May to early June).
Harvesting Period: Post-monsoon rains (beginning October).
Climate Requirements: Requires heavy rainfall and hot weather for growth.
Major Crops: Rice, maize, pulses (urad, moong dal), millets, cotton.

Zaid Crops:
Sowing and Harvesting Period: March to July (between Rabi and Kharif seasons).

Climate Requirements: Warm weather with adequate water supply.

Major Crops: Seasonal fruits (e.g. watermelon, muskmelon), vegetables, and fodder crops.

9. About Windfall Tax

A **windfall tax is imposed on industries or companies that experience extraordinary profits due to favorable market conditions, not attributable to their own efforts or innovation**. These taxes help governments capture a share of these gains to fund public projects, manage fiscal deficits, or address wealth disparities. **Introduced in July 2022, when global crude oil prices surged due to geopolitical tensions, including the Russia-Ukraine war.** It targeted domestic crude oil producers and exporters of petroleum products (e.g., petrol, diesel, ATF), who benefited from elevated global prices.

10. Presentation of the Aravalli Green Wall Project (AGWP)

India will present the AGWP, a major initiative aimed at restoring 1.15 million hectares of degraded land across four states in northwestern India. **Features of the Aravalli Green Wall Project(AGWP): The project covers the 5 km buffer area around the Aravalli Hill Range in Haryana, Rajasthan, Gujarat, and Delhi.**

National Goals: The project is part of India's effort to achieve the national goal of creating an additional 2.5 billion tonnes of carbon sink by 2030.

Broader Impact: The project contributes to India's commitments under international conventions such as:

➤ **UNCCD (United Nations Convention to Combat Desertification),**
➤ **CBD (Convention on Biological Diversity),**
➤ **UNFCCC (United Nations Framework Convention on Climate Change).**

Objectives and Features of AGWP:

The project focuses on **combating desertification, land degradation, and drought**. It integrates indigenous species afforestation, biodiversity conservation, and advanced water management strategies.

DECEMBER 5

1. Aleppo City:

Aleppo, or "Halab" in Arabic, is one of the world's oldest continually inhabited cities, being mentioned in Egyptian texts from the 20th century BC. It is a **principal city of northern Syria.** It is situated in the northwestern part of the country, about 30 miles (50 km) south of the Turkish border. It lies some 60 miles (100 km) from both the Mediterranean Sea (west) and the Euphrates River (east). Located at the crossroads of several trade routes from the 2nd millennium B.C., **Aleppo was ruled successively by the Hittites, Assyrians, Arabs, Mongols, Mamelukes and Ottomans.** Aleppo's most visible landmark is the medieval citadel, which sits on a partly man-made hill at the center of the city about 40 meters high. The Queiq River runs through the city, although it has at times run dry in Aleppo partly because of heavy water use in Turkey, where it originates. **Aleppo was a focal point of the Syrian Civil War from 2012 until 2016,** when opposition fighters there surrendered the city to government forces.

2. Surya Ghar Muft Bijli Yojana:

It is a **government scheme launched on February 15, 2024**, that aims to provide free electricity to households in India.

Under the scheme, households will be provided with a subsidy to install solar panels on their roofs. **The subsidy will cover up to 40% of the cost of the solar panels.** It would help **one crore families get up to 300 units of free electricity** per month with savings of up to Rs 18,000 annually. It is estimated that the scheme will save the government Rs. 75,000 crore per year in electricity costs. The scheme has an outlay of Rs 75,021 crore and is to be implemented till FY 2026-27. The **benefits of the scheme include: Free electricity for households., Reduced electricity costs for the government., Increased use of renewable energy and Reduced carbon emissions.**

Eligibility:

The **household must be an Indian citizen**. The household must own a house with a roof that is suitable for installing solar panels. The household must have a valid electricity connection. The household must not have availed any other subsidy for solar panels. **Under the scheme, DISCOMs are designated as State Implementation Agencies (SIAs) responsible for facilitating various measures, including net meter availability, timely inspection, and commissioning of installations.** DISCOMs will receive incentives based

on their achievement in the installation of additional grid-connected rooftop solar capacity beyond a baseline level. The total financial outlay for the 'Incentives to DISCOMs' component is Rs 4,950 crore.

3. Linen Inspection and Sorting Assistant System (LISA):

It is an **Artificial Intelligence-based system, that inspects and sorts linens such as bed sheets and towels provided to passengers in the air-conditioned coaches**. It is designed to ensure 100% quality inspection of bed sheets used in trains. Advanced AI algorithms ensure precise and reliable inspection results and it can process large volumes of linens quickly, significantly improving operational efficiency. It was **developed by the Pune division of Indian Railways and installed in Ghorpadi Integrated Coaching Complex (GICC).**

What is Artificial Intelligence?

Artificial Intelligence refers to machines performing human-like tasks. Its main components **are Machine Learning algorithms that train on data, Neural Networks that mimic the brain's structure, and Natural Language Processing that understands human language.**

4. Subabul Tree:

It is a **fast-growing leguminous tree commonly found in tropical and subtropical regions**. It originates from Mexico is a small, perennial, woody, highly branched to medium-sized tree with a short, clear bole. It was introduced as a cover crop in plantations and for fodder and fuel. It is mainly found in **Andhra Pradesh, Kerala, Maharashtra, Odisha and Tamil Nadu**. The leaves and immature seeds are eaten in the form of soups or salad, both raw and cooked, providing a rich source of protein and fibre, leading to its traditional usage in human and animal food by different ethnic communities. It is **valuable for its wood,** which is used to make **good quality charcoal, small furniture and paper pulp.**

5. What is diabetes?

It is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. **Insulin is a hormone that regulates blood glucose**.

Type 2 Diabetes: In this condition the **human body doesn't use insulin well and can't keep blood sugar at normal levels.** It develops over many years and is usually diagnosed in adults (but more and more in children, teens, and young adults).

6. Air Quality Dashboard

The dashboard combines ground sensor data with satellite imagery to provide a comprehensive view of air pollution across local, sub-regional and regional scales. Among its tools is a **dynamic timelapse powered by the Weather Research and Forecasting model coupled with Chemistry (WRF-Chem).** This model reveals the alarming spread of PM2.5 plumes across the region, including hotspots like **Lahore, New Delhi and Kolkata**. The WRF-Chem model on the dashboard allows users to explore the interaction between weather patterns and air pollution sources, providing insights into pollution outbreaks and trends. It integrates emissions data at both local and regional levels, offering a clearer picture of pollution dynamics across borders. Users can also access two-day forecasts, enabling communities, policymakers and researchers to anticipate air quality conditions.

7. International Centre for Integrated Mountain Development:

It is an **intergovernmental knowledge and learning centre working on behalf of the people of the Hindu Kush Himalaya (HKH).** It was formally established and inaugurated on 5 December 1983.
Member countries: Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan.
Functions:
➢ It **serves the region through information and knowledge generation** and sharing to find innovative solutions to critical mountain problems.
➢ It **bridges science with policies and on-the-ground practices**.
➢ It provides a regional platform where experts, planners, policymakers, and practitioners can exchange ideas and perspectives towards the achievement of sustainable mountain development.
Headquarter: Kathmandu, Nepal

8. About PROBA-3 Mission (Project for Onboard Autonomy)

Scientific Goals: Advance understanding of solar storms and coronal mass ejections that affect Earth's satellite operations, communication systems, and power grids. Provide critical data for solar dynamics and space weather phenomena. Test new spacecraft technologies and concepts. **Enhancing expertise in solar science following ISRO's Aditya-L1 mission.**

Agencies Involved: ESA leads the mission, and ISRO, through NewSpace India Ltd (NSIL), will facilitate the launch.

Spacecraft: The mission uses two spacecraft:

Coronagraph: Studies the Sun's corona.

Occulter: Blocks the Sun to create artificial eclipses for better observation.

9. World Wildlife Conservation Day

Syllabus: GS3/ Conservation

On **World Wildlife Conservation Day (December 4),** India celebrates its rich biodiversity while reflecting on efforts to safeguard its critically endangered species.

About India's Unique Ecosystem

Biodiversity Hotspots: India is home to four of the 34 global biodiversity hotspots — **Himalaya, Indo-Burma, Western Ghats-Sri Lanka, and Sundaland.**

Diverse Wildlife: Despite occupying just 2.4% of the world's land area, India supports 7-8% of recorded species, making it one of the megadiverse countries globally.

10. What are High-Risk Food Categories?

They are **ready-to-eat items that can support pathogen growth, requiring careful handling and separation from raw foods.** High-risk foods are often linked to food poisoning outbreaks. In addition to packaged water, other products that fall under this category include: dairy products, meat, fish, eggs, prepared foods, sweets and fortified rice kernels. Businesses in the high-risk food category are required to undergo annual audits by FSSAI-recognised third-party food safety agencies.

11. Food Safety and Standards Authority of India (FSSAI):

It is an autonomous body under the Ministry of Health and Family Welfare. Established in 2008 under Food Safety and Standards Act, 2006 ensuring proper regulation, storage and distribution of food for consumption

12. Indo-Pacific Economic Framework for Prosperity (IPEF)

IPEF was launched in 2022, in Tokyo. The members are **Australia, Brunei, Fiji, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand, Vietnam and the U.S**. IPEF partners represent approximately 40 percent of the global GDP, and 28 percent of global goods and services trade. The IPEF seeks to strengthen economic engagement and cooperation among partner countries with the goal of advancing growth, economic stability and prosperity in the region. **The framework is structured around four pillars relating to Trade (Pillar I), Supply Chain Resilience (Pillar II), Clean Economy (Pillar III), and Fair Economy (Pillar IV). India had joined Pillars II to IV of IPEF while it has maintained an observer status in Pillar-I.**

13. Murphy's Law

The Law is attributed to **Captain Edward A. Murphy, Jr., an engineer in the U.S. Air Force,** during a 1949 deceleration test for rocket sleds. **Murphy's Law states, "Anything that can go wrong, will go wrong."** It underscores a realistic, albeit pessimistic, perspective on the inevitability of errors. **By emphasizing the likelihood of mishaps, it encourages meticulous planning and readiness for potential failures.** Murphy's Law also applies to everyday life. We've all experienced those moments when it seems like everything that could go wrong does go wrong. Recognizing this tendency can help us be more prepared.

6 DECEMBER

1. World Drought Atlas:

It has been launched by the **United Nations Convention to Combat Desertification (UNCCD) in collaboration with European Commission Joint Research Centre.** It explains how worsening drought risks are linked to human activities and then delves into the impacts of drought in **five key areas—water supply, agriculture, hydropower, inland navigation, and ecosystems.** It features 21 case studies from around the world, underscoring that no country is immune to drought and all can better prepare for it. It describes concrete measures and pathways to manage, reduce, and adapt to systemic drought risks;

underscores the co-benefits of these actions for different sectors; and showcases best practices from different regions.

The measures highlighted in the Atlas fall into three categories:

➢ **Governance** (e.g. early warning systems, microinsurance for smallholder farmers, pricing schemes for water usage);

➢ **Land-use management** (e.g. land restoration and agroforestry);

➢ **Management of water supply and use** (e.g. wastewater reuse, managed groundwater recharge and conservation.)

2. Gharcholas Saree:

It is also known as **Ghatchola and Gharcholu which has finest bandhani work of Gujara**t. It is traditionally been used for years in Gujarati weddings. **The name 'Gharchola' means 'Outfit for Home',** which **symbolizes a newly wedded bride joining her new home.**

Features: It is woven on Cotton or Silk fabric in large checks of using Silk and Zari threads. This is further colored in **Bandhani or tie & dye technique**. These checkered patterns are filled with small golden motifs of peacocks, lotus, human figures, and floral designs. These are traditionally crafted in auspicious colours such as red, maroon, green, and yellow, which hold special significance in Hindu customs. **A Gharchola Saree with 12 squares is known as 'Bar Bagh', while the one with 52 squares is known as 'Bavan Bagh'**. The designs often **incorporate symbols of fertility and prosperity, such as the kalash and the paan**. In recent time weavers are infusing modern designs and techniques into their gharcholas, blending tradition with contemporary appeal. This is the **27th GI tag that Gujarat has received**.

3. SVAGRIHA Rating:

SVAGRIHA rating that stands for **Simple Versatile Affordable GRIHA – supports the concept of green buildings and sustainability under Green Rating for Integrated Habitat Assessment (GRIHA).** It is a guidance-cum-rating system being developed for small stand-alone buildings like residences, commercial offices, motels, dispensaries, schools etc. **It has been developed in order to help reduce the environmental impact of these small developments.**

Rating system:

It will be **applicable only for projects which are less than 2500 sq.m. built-up area**. The rating system has **14 criteria**.

Criteria: The criteria are divided into 5 broad sub-groups namely: architecture & energy, water & waste, materials, landscape and lifestyle. It will be mandatory to attempt certain points under each sub-group. The total points that a project can achieve are 50. **The rating will be done on a 1–5-star scale**. It has been designed as a simple online tool with guiding parameters which will evaluate the performance of the project with respect to SVAGRIHA in a simple, easy to understand manner.

Kalughat Intermodal Terminal:

It is one among several infrastructural interventions made by **Inland Waterways Authority of India (IWAI) for capacity augmentation of National Waterway 1 – River Ganga**. It has received the five-star rating for its efforts to for environmental sustainability by ensuring usage of recyclable materials like fibre, recyclable glasses, paint, sanitary fixtures etc during the building of the terminal.

4. Homo juluensis: It is a new species of ancient humans with distinctively large skulls. The species, known **as "big head people," lived 300,000 years ago and survived in small groups across eastern Asia** before disappearing around 50,000 years ago. **Juluensis includes mysterious groups like the Denisovans**—ancient human relatives whose histories are still being uncovered. **Fossils attributed to juluensis, primarily consisting of facial and jaw remains, exhibit dental characteristics reminiscent of Neanderthals.** Initial measurements indicate that their braincases were up to 30% larger than those of Homo sapiens. They hunted wild horses in small groups, and made stone tools and possibly processed animal hides for survival.

About Neanderthals: They were an **extinct relative of modern humans** once found across Europe, extending into Central and Southwest Asia. They are our **closest extinct human relative**. Current evidence from both fossils and DNA suggests that Neanderthal and modern human lineages separated at least 500,000 years ago. Although they are long extinct, their genes are still present in modern human DNA.

5. Tikhir Tribe:

It is one of the **indigenous Naga tribes, found in Nagaland** and in parts of the neighboring States. Some live across the border, in Myanmar also. **They speak a language called. Naga Yimchungru**, which is part of the Tibeto-Burman language family, like other Naga languages. They make their living from agriculture and hunting. At one time, the Tikhir were headhunters and a man's prestige depended upon the number of enemies he had killed. **Headhunting was banned, and the last recorded incident took place in the 1960s.**

Beliefs:

With the coming of the Christian missionaries to Nagaland, most **Tikhirs converted to Christianity**. Many of the Tikhir practice elements of folk religion with their Christianity. "**Tsonglaknyi" the main Tikhir Festival, is observed from 9th to 12th October every year.** It is basically a festival of the sanctification of Shield.

6. Levirate Marriages in India: The Centre for DNA Fingerprinting and Diagnostics (CDFD) recently found the practice of levirate in a family through DNA sampling.

About

Practice: Levirate is a **cultural practice in which a widow marries the brother of her deceased or mentally or physically incapacitated husband's brother**. The family would prefer to keep such knowledge private.

Reasons: By marrying her deceased husband's brother, she could retain her **social standing and access to property and resources**. The brother of the deceased is expected to produce offspring who would inherit the family wealth and name.

Communities: In tribal cultures, such as among the **Bhils, Gonds, and some other indigenous groups, levirate marriages were more common.** Though not as common, levirate marriage existed in some Hindu communities, especially in rural areas. Its prevalence has declined in modern times due to legal, social, and cultural changes.

7. Lake Effect Snow

Lake-effect snow blowing in from the **Great Lakes has impacted parts of Michigan, Ohio, Pennsylvania and New York.**

About

Lake effect snow is common across the Great Lakes region during the late fall and winter. It occurs **when cold air, originating from Canada, moves across the open waters of the Great Lakes.**

Process of Lake effect snow

As the cold air passes over the **unfrozen and relatively warm waters of the Great Lakes, warmth and moisture are transferred into the lowest portion of the atmosphere**. The air rises, clouds form and grow into a narrow band that produces 2 to 3 inches of snow per hour or more.

Geographical Factors

The physical geography of lakes and surrounding terrain influences snowfall distribution. **Wind direction determines which areas receive snow, causing sharp contrasts; heavy snow in one area and clear skies just a mile away.**

8. Mission Shakti

It is a **scheme aimed at enhancing women's safety, security, and empowerment**. It focuses on addressing issues affecting women throughout their life cycle and promoting women as equal partners in nation-building through collaboration and citizen involvement. **It consists of two sub-verticals: 'Sambal' for women's safety and security, and 'Samarthya' for women's empowerment**. Sambal includes schemes like **One Stop Centres (OSC), Women Helpline (181-WHL), and Beti Bachao Beti Padhao (BBBP)**. Samarthya includes schemes like P**radhan Mantri Matru Vandana Yojana (PMMVY), Ujjwala, Swadhar Greh (now Shakti Sadan), Working Women Hostel (now Sakhi Niwas), National Hub for Empowerment of Women (NHEW), and National Creche Scheme (now Palna)**.

9. The Beti Bachao Beti Padhao (BBBP) scheme

It was **launched on January 22, 2015, is a collaborative effort between the Ministry of Women & Child Development, the Ministry of Education, and the Ministry of Health and Family Welfare**. Its objectives are to prevent gender-biased sex-selective practices, ensure the survival and protection of the girl child, and promote her education. The scheme is **Centrally Sponsored Scheme** (100% funding by the Central Government) and implemented in all districts except West Bengal

10. About Brain Rot

Meaning: It describes the **perceived deterioration of mental or intellectual faculties due to excessive consumption of trivial or unchallenging online content**, particularly on social media platforms. The concept of "brain rot" is associated with several cognitive and mental health concerns: **Decreased Attention Span, Reduced Critical Thinking, Mental Health Issues**

11. Extrachromosomal DNA

Three papers in Nature have reported how extrachromosomal DNA contributes to the progression of cancer and drug resistance.
About

Extrachromosomal DNA refers to DNA that exists outside the chromosomes in the cell. Unlike the chromosomal DNA that is located in the nucleus (in eukaryotic cells) or the nucleoid region (in prokaryotic cells), **extrachromosomal DNA exists independently or in a separate structure within the cell.** Some cells, especially cancer cells, have Extrachromosomal circular DNAs (ecDNAs), which are small circular DNA molecules that are separate from the chromosomal DNA. **These molecules can carry multiple copies of certain genes and may be involved in the amplification of genes, such as those responsible for drug resistance**. Chromosomal DNA contains the complete set of genetic instructions necessary for the development, functioning, and reproduction of an organism. It carries the vast majority of the organism's genetic information, organized into genes, which are the building blocks for proteins and cellular structures. In **humans, there are 23 pairs of chromosomes, each containing a single, long molecule of DNA.**

DECEMBER 9

1. Lake-Effect Snow
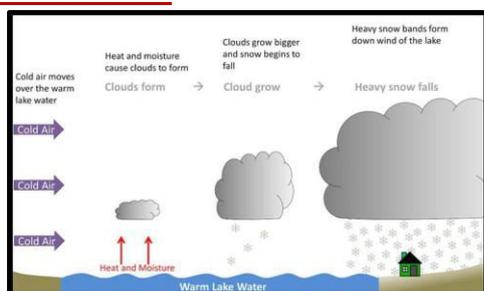
Recently, Lake-effect snow blowing in from the **Great Lakes has blanketed parts of Michigan, Ohio, Pennsylvania and New York region**s. It is a localized weather phenomenon which results from the interaction between cold air passing over warmer lake water generating snow that is deposited in localized regions downwind from the lake. It is **common across the Great Lakes region during the late fall and winter.**

Formation: It occurs when cold air, often originating from Canada, moves across the open waters of the Great Lakes**. As the cold air passes over the unfrozen and relatively warm waters of the Great Lakes, warmth and moisture are transferred into the lowest portion of the atmosphere. **The air rises, clouds form and grow into narrow band that produces 2 to 3 inches of snow per hour or more.** Lake effect snow occurrence and location is mainly dependent on wind (speed and direction) and topography.

2. Anna Chakra

Recently, the Union Minister of Consumer Affairs, Food and Public Distribution launched 'Anna Chakra' and SCAN (Subsidy Claim Application for NFSA) portal.

About Anna Chakra:
It is a **Public Distribution System (PDS) Supply chain optimisation tool**. It is spearheaded by Department of Food Public Distribution, which enhance the efficiency of the PDS logistics network across the country. It is **developed in collaboration with the World Food Programme (WFP) and Foundation for Innovation and Technology Transfer (FITT), IIT-Delhi.**
Working: The project **leverages advanced algorithms to identify optimal routes and ensure seamless movement of food grains across supply chain nodes**. An operation of this magnitude involves a complex supply chain, relying on multiple stakeholders starting from **farmers to Fair Price Shops**. The inter-state route optimization tool has been developed for optimization of the PDS movement between the states and it is integrated with the **FOIS (Freight Operations Information System) portal of the Railways through Unified Logistics Interface Platform (ULIP).** A significant milestone in this effort is the integration of the optimization tool with the PM Gati Shakti platform which now houses geo-locations of FPSs and warehouses across the states.

About SCAN (Subsidy Claim Application for NFSA) portal:

It will provide for a **single window submission of subsidy claims by states, claim scrutiny and approval by DFPD facilitating expeditious settlement process**. The portal will ensure end-to-end workflow automation of all the processes for release and settlement of food subsidy using rule-based processing.

3. Indian National Trust for Art and Cultural Heritage (INTACH):

It is an **autonomous non-profit organisation set up in 1984 with a mandate to protect and conserve India's vast natural, built and cultural heritage.** It is recognized as one of the world's largest heritage organizations, with over 228 Chapters across the Country. It is essentially a volunteer-based organization and its enthusiastic volunteers in a network of chapters in cities, towns and villages across the country are largely responsible for the spread of awareness about the vast cultural heritage of the country.

Headquartered in New Delhi, it operates through various divisions such as:

➢ Architectural Heritage
➢ Natural Heritage
➢ Art & Material Heritage
➢ Intangible Cultural Heritage, Heritage Education, and Communication Services (HECS)
➢ Heritage Crafts and Community
➢ Chapters
➢ INTACH Heritage Academy
➢ Heritage Tourism
➢ Listing Cell
➢ INTACH Knowledge Centre.

4. National Council for Vocational Education and Training (NCVET):

It was **established by the Ministry of Skill Development and Entrepreneurship (MSDE), Government of India in 2018,** as a regulatory body, aimed at ensuring quality in the Technical and Vocational Education and Training (TVET) sector. It has taken over the roles previously held by the National Skill Development Agency (NSDA) and the former National Council of Vocational Training (NCVT). It has been **entrusted with the development, qualitative improvement, and regulation of vocational education entities** involved in both long- and short-term vocational education and training while also establishing minimum standards for their operations.

The principal functions of NCVET encompass:

➢ Recognize, monitor, discipline, and de-recognize Awarding Bodies.
➢ Recognize, monitor, discipline, and de-recognize Assessment Agencies.
➢ Recognize, monitor, discipline, and de-recognize Skill Information Providers.
➢ Frame guidelines for the approval of qualifications and approve qualifications in the manner set out in such guidelines.
➢ Create and monitor a system of redressing grievances against recognized bodies.

5. Punatsangchhu-II Hydropower Project:

It is a **1 GW run-of-the-river hydroelectric power-generating facility under construction in the Wangdue Phodrang district of Bhutan**. It is located on the **right bank of the Punatsangchhu River in the Wangdue Phodrang district in Western Bhutan.** The project is being developed by the Punatsangchhu II Hydroelectric Project Authority, under an Inter-Government Agreement between the Royal Government of Bhutan and the Government of India**. It is funded by the Government of India with 30% grant and 70% loan**. The project Authority shall be dissolved within two years after the commissioning, and the project shall be handed over to the Royal Government of Bhutan. **The project involves the construction of a 91m-high and 223.8m-long concrete gravity dam, along with an 877.46m-long and 12m-diametre diversion tunnel with a discharge capacity of 1118 cubic metres per second.**

6. Global Strategy for Resilient Drylands:

This initiative is spearheaded by **Consultative Group on International Agricultural Research (CGIAR), International Center for Agricultural Research in the Dry Areas (ICARDA) and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)**. It provides a roadmap to enhance food security, conserve biodiversity and build resilient livelihoods for the 2.7 billion people inhabiting drylands, particularly in Asia and Africa. It was **launched at the 16th Conference of Parties to the United Nations**

Convention to Combat Desertification (COP16) in Riyadh. It was developed through extensive consultations with national research organizations, governments, private sector partners, and civil society, ensuring its alignment with the specific needs of different dryland regions.

What is CGIAR?

It was **established in 1971**. It is a strategic partnership of diverse donors that support 15 international Centers, working in collaboration with many hundreds of government- and civil society organizations as well as private businesses around the world.

7. RuTAG Initiative:

Rural Technology Action Group (RuTAG) is an initiative of the Office of the Principal Scientific Adviser (PSA) to the Government of India launched in 2004. It was conceptualized as a mechanism to provide a higher level of Science & Technology intervention and support for rural areas. Under this initiative, the interventions are designed to be primarily demand-driven, focusing on bridging technology gaps at the grassroots level, upgrading technology, and providing training and demonstrations through innovative projects. **The Office of the PSA launched RuTAG 2.0 in April 2023, with a focus on commercialization and broader dissemination of developed technologies as products, ensuring wider accessibility and socio-economic impact.** The RuTAG 2.0 initiative emphasizes translating innovation into market-ready products reflecting its commitment to driving transformative changes in rural areas and empowering communities for sustainable development.

8. Business 4 Land Initiative:

It is **United Nations Convention to Combat Desertification's (UNCCD) initiative to engage the private sector in sustainable land and water management**. It helps companies and financial institutions manage risks and seize opportunities tied to land degradation and drought. It aims to restore 1.5 billion hectares of land by 2030, contributing to Land Degradation Neutrality (LDN), a global commitment to achieve net zero land degradation by 2030, as well as enhancing drought resilience.

Its work is built around three key pillars:

➢ **Business operations and value chains**: Promote sustainable practices and set targets for reducing land-related impacts across business operations.
➢ **Finance:** Support the creation of sustainable finance solutions for land restoration and drought resilience.
➢ **Advocacy:** Advocate for policies that foster a business environment conducive to sustainable land and water management.

9. United Nations Convention to Combat Desertification (UNCCD):

It was **established in 1994 to protect and restore our land and ensure a safer, just, and more sustainable future.** It is the only legally binding framework set up to address desertification and the effects of drought. There are **197 Parties to the Convention, including 196 country Parties and the European Union.**

10. Copernicus Programme:

It is the **Earth observation component of the European Union's Space programme**. It offers information services that draw from satellite Earth Observation and in-situ (non-space) data. It **consists of a complex set of systems that collect data from multiple sources, including Earth Observation satellites, in-situ sensors like ground stations, and airborne and sea-borne sensors.** Users have free and open access to a great deal of this data, which is also processed to provide a set of services based on reliable and near-real time information. **Copernicus is served by a set of dedicated satellites (Sentinel family) and contributing missions.** The Sentinel satellites are specifically designed to meet the needs of the Copernicus information services and their users. **Since the launch of Sentinel-1A in 2014, the European Union has initiated a process to place a complete constellation of almost 20 satellites in orbit before 2030**. The services of Copernicus, address six thematic areas namely: **atmosphere, marine, land, climate, emergency response, and security**. Copernicus is funded, coordinated and managed by the European Commission in cooperation with partners such as European Space Agency and other EU agencies.

About Sentinel-1C:

It **delivers high-resolution radar images to monitor Earth's changing environment**. It supports various

applications, advances scientific research, and adds new capabilities for tracking maritime traffic.

10 DECEMBER

1. Indian Star Tortoise:
Its name comes from the star-like patterns that feature on its high-domed shell. It has very distinctive patterns and its highly rounded shell makes it popular in the world's trade in exotic pets.

Habitat:
They **occupy a wide variety of habitats, including semi-arid lowland forests, thorn scrub forests, semi-desert and arid grasslands.** This species has a high tolerance for habitats that are seasonally wet or dry, with many populations inhabiting areas with a monsoon or rainy season followed by a long hot and dry period. It is **endemic to the subcontinent and resides in arid pockets of northwest India (bordering Pakistan), South India, and Sri Lanka**. However, members of the species have also been found in people's homes as far afield as Canada and the U.S. It is generally crepuscular, which means they are active in the early morning and the late afternoon during dry, hot weather. Indian star tortoises are mainly herbivores and mostly eat grasses, herbaceous leaves, flowers etc.

Conservation status:
IUCN: Vulnerable
CITES: Appendix I
Wildlife (Protection) Act 1972: Schedule I
Threats: The highly fragmented habitat of the species, is greatly influenced by an increased level of urbanisation and agricultural practices throughout its range.

2. UN Commission on Narcotic Drugs:
It is the **principal policy-making body of the United Nations on drug-related matters**. It is mandated to monitor global drug trends, support Member States in formulating balanced policies, and oversee the implementation of the major international drug conventions. It is **mandated to decide on the scope of control of substances under the three international drug control conventions (1961, 1971 and 1988 Conventions)**. It was established by the resolution of the United Nations Economic and Social Council

(ECOSOC) IN 1946. It is **one of the functional commissions of the ECOSOC and a Governing Body of the United Nations Office on Drugs and Crime (UNODC).** The **CND has 53 member states that are elected by ECOSOC. It is chaired by a Bureau including one member per Regional Group**. It has five subsidiary bodies: the Heads of National Drug Law Enforcement Agencies in Europe, Latin America and the Caribbean, Asia and the Pacific and Africa, and the Sub-commission in the Near and Middle East. It meets annually and adopts a range of decisions and resolutions. Intersessional meetings are convened throughout the year. Towards the end of each year, the Commission meets at a reconvened session to consider budgetary and administrative matters as the governing body of the United Nations drug programme.
Headquarter: It is headquartered in Vienna.
Significance to India: This is the first **time that India has been named to Chair this important UN body**. This reinforces India's growing leadership role on the global stage and its commitment to addressing international issues through established multilateral mechanisms

3. MuleHunter. AI:
It is the **Artificial Intelligence/ Machine Learning-based model.** It has been **developed by the Reserve Bank Innovation Hub (RBIH), which is a subsidiary of Reserve Bank of India**. This model enables detection of mule bank accounts in an efficient manner. A pilot with two large public sector banks has yielded encouraging results.

Advantages
- **Identification of Mule Accounts**: It **focuses on identifying and tracking mule accounts, which are often used to facilitate fraudulent transactions**. By analyzing transaction patterns, the system can flag suspicious accounts that are being used to transfer illegally obtained funds.
- **Real-time Monitoring:** It enables real-time monitoring of transactions, allowing banks and financial institutions to detect and respond to suspicious activities promptly. This immediate action can prevent further fraudulent transactions.
- **Data Analytics:** It employs advanced data analytics and machine learning algorithms to assess large volumes of transaction data. This helps in recognizing trends and patterns associated with

fraudulent activities, making it easier to preemptively shut down potential scams.

➢ **Collaboration Among Institutions:** The platform encourages collaboration among banks, payment service providers, and law enforcement agencies. Sharing information about identified mule accounts helps create a more comprehensive defense against digital fraud.

➢ **Regulatory Compliance:** It **aids financial institutions in complying with regulatory requirements related to anti-money laundering (AML) and combating the financing of terrorism (CFT),** thus enhancing the overall integrity of the financial system.

4. What is a mule bank account?

It is a **bank account, used by criminals for illegal activities, including the laundering of illicit funds**. A mule account is typically bought over by the criminals from their original users, individuals who are often from lower income groups, or have low levels of technical literacy. **The related term "money mule" is used to describe the innocent victims who are used by the criminals to launder stolen or illegal money via their bank accounts**. When such incidents are reported, the money mule becomes the target of police investigations, because it is their accounts that are involved, while the actual criminals remain undetectable.

5. Lonar Lake:

It is a **lagoon lake in the Buldhana district of Maharashtra**. It was created due to the impact of a meteorite. It is the **only known saline crater lake in the world**, formed by the impact of a meteorite about 50,000 years ago. Its water is seven times saltier than average seawater. The lake has a diameter of 1.2 kilometers and a depth of 150 meters, and is surrounded by a rim of hills that rise up to 75 degrees. **One of the most striking aspects is its color, which changes from green to pink depending on the season and the water conditions**. This is caused by the presence of microorganisms that thrive in the saline and alkaline environment of the lake.

6. Moths:

Moths are insects that belong to the order Lepidoptera, which they share with butterflies. There are around 160,000 known species of moths, far outnumbering butterfly species. Highly adapted, they live in all but polar habitats. **Moths vary greatly in size, ranging in wingspan from about 4 mm (0.16 inch) to nearly 30 cm (about 1 foot).** They often have duller colors compared to butterflies, which helps with camouflage. **Some, like the luna moth or atlas moth, are vividly colored. Moth antennae are often feathery, unlike the thin and clubbed antennae of butterflies.** Most moths are active at night, but some are diurnal. The larvae and adults of most moth species are plant eaters. Larvae in particular do considerable damage to ornamental trees and shrubs and to many other plants of economic importance.

7. About Angami Naga Tribe

Location and Ethnic Background:

Region: Prominent Naga tribes primarily reside in the Kohima district of Nagaland, with some recognized in Manipur.

Migration: Ancestors migrated from Myanmar to Nagaland.

Ethnicity: Belong to the Mongoloid race.

Language:

Tenyidie: Most commonly spoken language among the Angami Nagas in Nagaland.

Nagamese: A pidgin language derived from Assamese, Bengali, Hindi, and Nepali, used as a lingua franca.

Culture and Economy:

Agriculture: Known for terrace wet cultivation.

Practice shifting (Jhum) cultivation.

Animal Husbandry: A significant livelihood activity.

Craftsmanship: Renowned for cane and bamboo basketry.

Signature product: Khophi, a utility basket.

Religion: Majority have embraced Christianity.

Society: Patriarchal and patrilineal.

Festival: Sekrenyi is the most important festival, celebrated with great enthusiasm.

8. Commission on Narcotic Drugs (CND)

Context

India has been chosen to Chair the **68th Session of the Commission on Narcotic Drugs (CND).** This is the first time that India has been named to Chair it.

About

It was established in 1946 by the United Nations Economic and Social Council (ECOSOC), it is the principal policy-making body of the United Nations on drug-related matters. It is mandated to monitor global

drug trends, support Member States in formulating balanced policies, and oversee the implementation of the major international drug conventions. The CND **has 53 member states that are elected by ECOSOC. It is chaired by a Bureau including one member per Regional Group.**

9. Oilfields Amendment Bill, 2024

Context

The Rajya Sabha passed the Oilfields (Regulation and Development) Amendment Bill, 2024. The Bill amends the Oilfields (Regulation and Development) Act of 1948.

Major Highlights

➢ **Definition of mineral oils expanded**: The Bill expands the definition to include: any naturally occurring hydrocarbon, coal bed methane, and shale gas/oil. It clarifies that mineral oils will not include coal, lignite or helium.

➢ **Introduction of petroleum lease:** The Bill replaces the mining lease with a petroleum lease, which also covers a similar set of activities.

➢ **Private Investment**: The Bill includes several provisions for encouraging investment from private players to spur domestic production of petroleum and other mineral oils.

➢ **Decriminalisation of offences:** The Bill provides that the violation of Rules will be punishable with a penalty of Rs 25 lakh.

➢ **Adjudication of penalties:** The central government will appoint an officer of the rank of Joint Secretary or above for adjudication of penalties

DECEMBER 11

1. Subaru Telescope:

It is a **Japanese 8.2-metre optical-infrared telescope**. It is located on the dormant volcano Mauna Kea (4,163 metres) on the island of Hawaii. **The telescope is named for the Japanese name for the Pleiades (a star cluster in the Taurus constellation) and is operated by the National Astronomical Observatory of Japan**. Its powerful light-collecting capability can capture weak light from celestial objects. **To minimize air turbulence near the telescope, the dome that surrounds the telescope is cylindrical instead of a hemisphere, as is the case with most other observatories**. The Subaru

Telescope has observed various celestial bodies, from nearby shooting stars to galaxies located 13.1 billion light years away.

2. Voronezh Radar:

The **Voronezh radar system is a critical component of Russia's early warning and missile defence infrastructure**. It is capable of identifying and tracking a range of threats, including ballistic missiles and aircraft, over distances of up to 8,000 kilometers. These radars are strategically deployed across Russia to provide extensive coverage against potential missile threats. **They employ phased array technology, which allows for rapid electronic steering of the beam.** This makes them highly efficient and less mechanically complex than older systems. **There are several varieties of these radars operating in the meter (Voronezh-M), decimeter (Voronezh-DM), or centimeter (Voronezh-CM) wavelength range, as well as a few others that combine several ranges**. Multiple Voronezh radars can work in unison as part of an integrated Missile Attack Early Warning System to generate a comprehensive radar picture of potential missile threats and space activity.

3. Article 67(b):

The **Vice President of India serves as the ex-officio Chairman of the Rajya Sabha.** Article 67(b) of the Constitution of India outlines how the Vice President can be removed from office. It states that **the Vice President may be removed from her/his office by a resolution of the Council of States (Rajya Sabha) passed by the special majority and agreed to by the House of the People (Lok Sabha) by a simple majority**. No such resolution can be moved unless 'at least a 14-day notice has been given of the intention to move the resolution. The notice must clearly state the intention to initiate the resolution and outline the reasons for it. The Constitution does not specify particular grounds for removal, leaving it to the discretion of the Members of Parliament.

4. Bima Sakhi Yojana:

It is an initiative of the State-owned Life Insurance Corporation (LIC). It is **designed to empower women aged 18-70 years who have passed out of Class 10.** They will receive **specialised training** and a stipend for the first three years to promote financial literacy and insurance awareness. **After training, they can serve as**

LIC agents and the graduate Bima Sakhis would have the opportunity to qualify for being considered for Development Officer roles in LIC. Women LIC agents will get a stipend of Rs. 7,000 per month for the first year, Rs. 6,000 per month in the second year, and Rs. 5,000 per month in the third year. Bima Sakhis will also get commission of Rs 48,000 (excluding bonus) for the first year. The plan is to appoint two lakh Bima Sakhis over a period of three years. Relatives of existing agents and employees are not eligible for the scheme. Retired employees are also ineligible.

5. GG Tau A System:

It is a unique triple-star system which is located 489 light-years away from Earth. **The system is young - 1 to 5 million years old, which makes it perfect for studying the early stages of planet formation**. Around these stars is a disk made of gas and dust, which is where planets begin to form. **The three stars in GG Tau A interact with each other and affect the disk of gas and dust around them, making it harder to predict how planets might form**. The forces between the stars could cause the disk to behave differently than in a system with just one star, unlike our solar system. This makes GG Tau A, a perfect system to study how planets can form in more complicated, multi-star environments.

6. PM Surya Ghar Muft Bijli Yojana (PMSGMBY):
Objectives and Implementation
It is a **transformative initiative launched to promote the adoption of solar energy in residential households**. It aims to **provide free electricity to households through the installation of rooftop solar panels.** It has a substantial outlay of ₹75,021 crore and is set to be implemented until the fiscal year 2026-27. It targets the installation of 10 million small rooftop solar plants by March 2027, offering financial support ranging from ₹30,000 to ₹48,000 for capacities up to 3 kW. The **implementation is overseen by a National Programme Implementation Agency (NPIA) at the national level, while State Implementation Agencies (SIAs) manage the execution at the state level.**

7. About Eklingji Temple
Dedicated Deity: Lord Shiva, worshipped as Ekling Nath, the ruling deity of the Mewar kingdom.
Location: Kailashpuri, about 22 km from Udaipur, Rajasthan.

Built in: 8th century by **Bappa Rawal, the founder of the Mewar dynasty**. Represents the spiritual and administrative power of the Mewar kings, who ruled as representatives of Lord Ekling Nath.
Architectural Style: The temple complex comprises 108 temples, showcasing intricately carved stone architecture. Features a four-faced Shiva Lingam made of black marble, symbolizing the four forms of Lord Shiva. Originally linked to the **Pashupata sect, then Nath sect, and later to Ramanandis.**
Cultural Significance
Royal Connection: Historically managed by the Mewar royal family, who consider Lord Ekling Nath the real ruler of Mewar. The Diwan of Mewar acts as the deity's earthly representative.

8. New National Manuscripts Mission
Context
The committee of experts has recommended the continuation of the National Mission for Manuscripts (NMM) with broader reach and direct oversight by the Ministry.

About
Ministry: Ministry of Culture
Established in: 2003 (10th Five Year Plan)
Aim: To **conserve, and promote access to Indian manuscripts**. It functions as a unit under the Indira Gandhi National Centre for the Arts, for which funds are provided to the organization. It uses technology for preservation and digitization of manuscripts. Training is offered for various aspects of preventive conservation.

9. The University Grants Commission (UGC)
Established in **1956, it provides funding to universities and colleges**, sets guidelines for academic programs, and promotes research in institutions of higher learning.
Key functions of the UGC include:
➢ **Accrediting universities**: It grants recognition to universities in India.
➢ **Funding:** Provides financial assistance to universities and colleges for development, research, and other academic purposes.
➢ **Regulating standards:** Sets quality standards in teaching, research, and infrastructure in higher education institutions.

> **Promoting academic growth:** Encourages research, innovation, and the development of new courses in various fields

10. LIC's Bima Sakhi Yojana
Context

The Prime Minister has launched the '**Bima Sakhi Yojana' of Life Insurance Corporation in Haryana**.
About

It is **designed to empower women aged 18-70 years, who are Class X pass.** They will receive specialized training and a stipend for the first three years to promote financial literacy and insurance awareness. They can serve as **LIC agents and the graduate Bima Sakhis would have the opportunity to qualify for being considered for Development Officer roles in LIC.**

11. India-Australia Comprehensive Economic Cooperation Agreement (CECA)
Context

The 3-**day stocktake visit for India-Australia CECA was concluded recently**. The discussions covered areas of trade in goods, services, mobility, agri-tech cooperation, and more.

About

CECA is a free-trade agreement between two countries that strengthens their bilateral trade. **Australia and India first embarked on negotiations for a CECA in 2011. Talks were suspended in 2016. In** 2021, the two countries formally revived the CECA talks. Both countries are looking to expand their trade ties under CECA, to cover sectors like g**oods, services, rules of origin, government procurement, digital trade, and agri-technology**. It also aims to unlock the potential of sectors such as clean energy, agribusiness, education, skills development, and tourism. In 2023-24, India's imports from Australia declined 15% to USD 16.15 billion, while India's exports increased 14.23% to USD 7.94 billion. **Australia is India's 13th largest export destination and 14th largest import source for India.**

12. Bamboo Shoots
In News

The **discovery of anti-obesity properties in Melye-Amiley highlights the potential of India's rich biodiversity and traditional food systems in addressing modern health challenges**. The findings suggest that Melye-Amiley can help reduce lipid accumulation and promote fat burning, making it a potential natural solution for weight management and metabolic health.

About Melye-Amiley
Definition: Traditional fermented bamboo shoot from Tripura, known for its unique flavor and health benefits.
Region: Indigenous to Tripura, a state in North East India.
Source: Derived from locally fermented bamboo shoots, reflecting the region's rich cultural heritage.

13. About Hindon River
Origin: Upper Shivalik Hills in Saharanpur district, Uttar Pradesh.
Length: Approximately 400 kilometers before merging Yamuna River.
Tributaries: Major tributaries include **Krishni and Kali Rivers**, which significantly impact its flow and pollution levels.
Historical and Cultural Significance: Once considered a lifeline for communities along its banks. Known as **part of India's Sugar Bowl due to its role in supporting sugarcane cultivation in the region.**
Heavily Polluted: Reduced to a drain carrying industrial and domestic waste.

14. Indian star tortoise
Description: Recognizable for its obsidian shell with sun-yellow star patterns. Herbivorous and solitary; does not hibernate but becomes inactive in extreme weather. **Endemic to India and Sri Lanka, found in arid regions of northwest India, southern India, and Sri Lanka.**
Conservation Status:
CITES: Listed in Appendix I (prohibits international trade except for scientific purposes).
Wildlife (Protection) Act, 1972 (India): Schedule I (highest protection).
IUCN: Vulnerable.
Threats: Habitat loss, Illegal poaching for the exotic pet trade, Unscientific release of seized tortoises poses ecological risks.

Recent Research Findings:
Genetic Divergence: Two distinct groups exist: Northwestern group: Genetically less diverse but stable.

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Southern group: Highly diverse.

Historical Evolution: Divergence occurred around 2 million years ago due to climatic and habitat changes during the split from the Gondwana supercontinent.

DECEMBER 12

1. Consumer Confidence Survey (CCS):

It is a **survey that indicates how optimistic or pessimistic consumers are regarding their expected financial situation**. If the consumers are optimistic, spending will be more, whereas if they are not so confident, then their poor consumption pattern may lead to recession. It is **released by the Reserve Bank of India bi-monthly.**

Indicators of consumer confidence survey:
➢ **Current Situation Index (CSI)**
➢ **Future Expectation Index (FEI)**

Highlights:

Households displayed somewhat higher optimism on one year ahead outlook for major economic parameters, except prices. The **future expectations index (FEI) improved by 0.5 points to 121.9 in the latest survey**. The CCS survey showed that households anticipated higher spending over one year horizon on the back of higher essential as well as non-essential spending. Consumer confidence for the current period declined marginally owing to weaker sentiments across the survey parameters except household spending. **The current situation index (CSI) moderated by 0.7 points to 94 in November 2024 from 94.7 in September 2024.**

2. Radioactive Diamond Battery:

It a **carbon-14 diamond battery, a strange fusion of radioactive decay, synthetic diamonds and plasma chemistry**. It uses carbon-14, a radioactive isotope of carbon of half-life of 5,700, because it emits a short-range radiation, quickly absorbed by any solid material. It **functions similarly to solar panels but instead of using light particles, it captures fast-moving electrons from within the diamond structure.**

Applications:

It can **prove particularly helpful in healthcare where it can be used to power pacemakers, hearing aids, and ocular devices.** Patients won't need to replace batteries as the diamond battery can last for years. The battery could also be used in extreme environments – both in space and on earth – where it is not practical to replace conventional batteries. They can **also prove to be of great help in space missions without worrying about the power to replace or charge the power source of spacecrafts**.

3. Champions of the Earth award:

It was **established in 2005 and awarded by the United Nations Environment Programme (UNEP).** It is the **UN's highest environmental honour, recognises trailblazers at the forefront of efforts to protect people and the planet**. Every year, UNEP honours individuals and organizations working on innovative and sustainable solutions to address the triple planetary crisis of climate change, nature and biodiversity loss, and pollution and waste.

Champions of the Earth are celebrated in four categories:

➢ **Policy leadership**- Public sector officials leading global or national action for the environment. They shape dialogue, lead commitments and act for the good of the planet.
➢ **Inspiration and action**- Leaders taking bold steps to inspire positive change to protect our world. They lead by example, challenge behavior and inspire millions.
➢ **Entrepreneurial vision** -Visionaries challenging the status quo to build a cleaner future. They build systems, create new technology and spearhead a groundbreaking vision.
➢ **Science and innovation** - Trailblazers pushing the boundaries of technology for profound environmental benefit. They invent possibilities for a more sustainable world.

4. India Skills Report 2025

India's employability among graduates is expected to rise by 7 percent, reaching 54.81 percent in 2025, according to the 'India Skills Report 2025.' It has been prepared by the **industry body Confederation of Indian Industries (CII) in collaboration with Wheebox (a talent assessment agency) and All India Council for Technical Education (AICTE)**. It is based on data from over 6.5 lakh candidates who participated in the Global Employability Test (G.E.T.) across India, alongside insights from over 1,000 corporations across 15 diverse industries.

5. International Fund for Agricultural Development (IFAD):

IFAD is an **international financial institution and a specialized United Nations agency**. It invests in rural people, empowering them to improve their food security, nutrition, and incomes through funding of grants and low-interest loans to several projects. **Founded in 1977, in response to a global food crisis, IFAD - supported projects have reached hundreds of millions of people around the world**. It works in areas where poverty and hunger are most prominent. **It is the only specialized global development organisation exclusively focused on and dedicated to transforming agriculture, rural economies, and food systems.** IFAD grants support research, innovation, institutional change, and pro-poor technologies. **IFAD extends two types of grants, depending on the nature of the innovation and the scope of intervention: global or regional grants and country-specific grants. IFAD headquarters is located in Rome, Italy.** It is a member of the United Nations Development Group.

DECEMBER 13

1. Cess and Surcharge:

Cess and Surcharge are additional taxes that are levied over and above the basic tax liability.
Cess: It is calculated as a percentage of the base tax (e.g., income tax or GST) and is used for designated causes, like education, health, or sanitation. Cess is typically non-refundable and must be paid on top of the regular tax liability.
Examples include Education Cess and Health Cess.
Surcharge: It is **imposed on higher-income individuals, companies, or entities to increase government revenue.** Unlike cess, the surcharge does not have a specific earmarked purpose and goes into the general revenue fund. The rate of surcharge increases as the taxable income rises, and it is applied on top of the base tax amount.

2. Costal Hardening

Coastal hardening refers to 'rigid', semi-impermeable structures created by humans that alter the natural landscape, potentially obstructing the shoreline retreat, and landward translation of sandy beaches. These include **infrastructure such as seawalls,** harbours, roads, highways, buildings, railway revetments or other urban structures.

Impacts:
➤ **Disruption of natural processes**: Hard structures often interfere with the natural movement of sand, leading to increased erosion in other areas.
➤ **Loss of habitats:** Hardening destroys or degrades coastal ecosystems, including beaches, dunes, and wetlands that provide important habitats for wildlife.
➤ **Long-term sustainability issues:** Coastal hardening result in a "locking in" of coastal conditions, making future adaptation more difficult as sea levels rise.

3. About Desert Knight Exercise

Nations Involved: India, France, and the United Arab Emirates (UAE).
Location: Conducted over the **Arabian Sea,** approximately 350-400 km southwest of Karachi.
Objective: Strengthen trilateral defence cooperation. Enhance combat skills and interoperability among the air forces of the three nations.

4. About Marbled Duck

Physical Characteristics: Medium-sized duck with grey-white plumage. Features a large head and light eye patches. The diet consists of fish and aquatic plants.
Global Conservation
 Status: Classified as "Vulnerable" by the IUCN.
Population decline primarily due to: Habitat destruction, Hunting in breeding and wintering grounds.
Geographic Range and Habits: Native to Europe, breeding in the summer months.
Breeding occurs in three regions: Eastern Mediterranean. Western Mediterranean. Iran. Prefers lowland, shallow freshwater habitats for breeding.

DECEMBER 16

1. Commissioning of Nirdeshak

The Indian Navy is set to commission the latest survey ship, **Nirdeshak, at Naval Dockyard, Visakhapatnam. About**
Nirdeshak is the second ship of the Survey Vessel (Large) Project and is built at GRSE Kolkata.

Purpose: It is designed to conduct hydrographic surveys, aid in navigation, and support maritime operations.

Design: The **110-meter-long vessel, with a displacement of approximately 3800 tons, is powered by two diesel engines and is equipped with state-of-the-art Hydrographic and Oceanographic Survey Equipment**. The ship has an endurance of over 25 days at sea and a top speed exceeding 18 knots.

2. EMBO Global Investigator Network
Context
Dr. Prem Kaushal and Dr. Rajender Motiani, from the regional center for Biotechnology, has been selected for the European Molecular Biology Organization (EMBO) Global Investigator Network.

About
The **EMBO Global Investigator Network supports young group leaders in Chile, India, Singapore and Taiwan**. The group leaders in the early stages of setting up their independent laboratories. The new EMBO Global Investigators receive financial support for four years.

3. Regional Center for Biotechnology (RCB)
RCB is established by the Department of Biotechnology, with regional and global partnerships synergizing with the programmes of UNESCO as a Category II Centre. **It aims to provide world class education, training and conduct innovative research at the interface of multiple disciplines**. In 2016, RCB was recognised as an Institution of National Importance by the Parliament of India.

4. Rights for Fishermen over Marine Resources
Context
All the coastal State/Union Territories have already enacted their **Marine Fishing Regulation Acts (MFRAs) / Marine Fishing Regulations** to govern fishing activities within 12 nautical miles of territorial waters.

About
The coastal States/UTs through these MFRAs have earmarked the zones reserved for fishing only by the traditional fishermen using non-motorized and motorized fishing boats. **Mechanized fishing vessels are not allowed to fish**.

Areas Reserved by States: Gujarat has reserved the area up to 9 nautical miles from the shore, Goa has reserved the area up to 2.7 nautical miles; Karnataka has reserved the area up to 3.23 nautical miles; Tamil Nadu and Odisha have reserved the areas up to 5 nautical miles; and Andhra Pradesh has reserved the area upto 4.3 nautical miles

5. Rajmarg Saathi
National Highways Authority of India has updated specifications for new Route Patrolling Vehicles (RPVs) named 'Rajmarg Saathi'.
About
The RPVs conduct inspection of National Highway stretches to monitor and respond to emergency situations.

Rajmarg Saathi:
It has the **Provision for dashboard camera equipped with 'AI video analytics' to capture and identify cracks & potholes.** The data/ video footage shall be collected on weekly basis by NHAI and shall be integrated with NHAI One application for more efficient maintenance of roads. Equipped with the advanced communication and safety tools, these vehicles will be useful in **minimizing traffic disruptions, improving road safety and enhancing overall road user experience along the National Highways.**

6. National Highways Authority of India (NHAI)
It was **constituted by an Act of Parliament in 1988 under the administrative control of the Ministry of Road Transport and Highways.** NHAI has been set up as a Central Authority to develop, maintain and manage the National Highways. **The authority, however, became operational in 1995.**

7. Durgadi Fort
A Kalyan civil court ruled in favour of the Maharashtra government, rejecting the Muslim community's claim to the disputed site at Durgadi Fort.
About
Durgadi Fort is a historical fort located in the town of Durgadi, near Kalyan in the state of Maharashtra. It is situated on the banks of the Ulhas River. **The fort dates back to the 15th century and was originally built by the Adil Shahi Sultanate and later modified by the Marathas**. Over time, it came under the control of various rulers, including the Mughals and the

Marathas. In the 18th century, the fort was an important part of the Maratha defense system in the region. The **fort is known for its strategic location and its role in defending the region.**

8. First ice-free day in the Arctic:

The **Arctic Ocean may see its first ice-free day — when its waters have less than one million square kilometres of sea ice — by 2030**, or sooner than previously expected, according to a new study.

About the study

The **study, 'The first ice-free day in the Arctic Ocean could occur before 2030'**, was published in the journal Nature Communications.

Major Predictions:

The first ice-free day in the Arctic would be witnessed within seven to 20 years even if humans drastically cut greenhouse gas emissions in the following years. **The ice-free period can last between 11 and 53 days.** This means that the Arctic can also witness the first ice-free month.

Significance of Ice in Arctic Ocean

The **ice plays a critical role in regulating ocean and air temperatures, supporting marine habitats, and driving ocean currents that distribute heat and nutrients worldwide.** The sea ice reflects sunlight back into space, a process known as the albedo effect. As the ice melts, it exposes darker waters, which absorb more solar radiation, further accelerating warming in the region.

9. Competition Commission of India (CCI)

It is a **statutory body established in 2009 by the Government of India under the Competition Act, 2002**. The composition of the Commission consists of a Chairperson and not less than two and not more than six other members. It operates under the **Ministry of Corporate Affairs (MCA) with the following objectives:**

➢ **Eliminate practices** having adverse effect on competition,
➢ Promote and sustain competition,
➢ Protect the interests of consumers
➢ Ensure freedom of trade in the markets of India
➢ **Establish a robust competitive environment.**

10. What is sportswashing?

It is a term used to describe the practice of **nations, individuals, groups, or the corporations using sports to improve their reputations that have been damaged by misconduct or controversy**. It can be accomplished through hosting sporting events, purchasing or sponsoring sporting teams, or participating in a sport.

Examples of sportswashing includes:

➢ **The 1936 Berlin Olympics**: Hitler used the Olympics to improve Germany's international image.
➢ **The 1978 FIFA World Cup:** Argentina hosted and won the World Cup while its military junta threw dissidents out of planes.
➢ **The 2022 Winter Olympics held in China and the 2022 FIFA World Cup in Qatar**.

Greenwashing refers to misleading the general public into believing that companies, sovereigns or civic administrators are doing more for the environment than they actually are. This may involve making a product or policy seem more environmentally friendly or less damaging than it is in reality.

DECEMBER 17

1. About Sardar Vallabhbhai Patel

Early Life and Career: Born on 31st October 1875 in Nadiad, Gujarat. A successful lawyer who became involved in public service through his leadership in the Kheda Satyagraha (1918).

Public Service and Leadership: Elected President of the Ahmedabad Municipal Board in 1924; improved sanitation, drainage, and cleanliness in the city. **Led the Bardoli Satyagraha in 1928, gaining national fame and earning the title "Sardar" for his leadership**. Served as India's first Deputy Prime Minister and Home Minister from 1947 to 1950.. Known as the "**Iron Man of India**" for his commitment to national integration.

2. Santa Ana winds

Santa Ana winds are **dry, warm, and powerful winds that originate in the Great Basin, a region between the Rocky Mountains and the Sierra Nevada.** They occur when high-pressure systems develop over the inland deserts, while low-pressure conditions prevail over California's coastal areas. This pressure difference forces strong winds to flow

westward, descending the mountains toward the Pacific Ocean.

3. What is SAMARTH Udyog Bharat 4.0?

It is an **Industry 4.0 initiative of the Ministry of Heavy Industry & Public Enterprises, under its scheme on "Enhancement of Competitiveness in the Indian Capital Goods Sector".** It is aimed at promoting smart and advanced manufacturing technologies, boosting digital transformation, and strengthening India's manufacturing sector.

4. Graded Response Action Plan (GRAP)

The Graded Response Action Plan (GRAP) is an **emergency response mechanism for Delhi-NCR, designed to address deteriorating air quality based on the average AQI levels**. It involves multiple stakeholders and authorities to take action.

Stages: It has four stages based on AQI thresholds: Stage I for "poor" air (201-300), Stage II for "very poor" (301-400), Stage III for "severe" (401-450), and Stage IV for "severe+" (above 450).

The revised GRAP incorporates targeted actions from the earlier Stages III and IV into Stages II and III, based on scientific data, expert recommendations, and past experiences.

5. National Energy Conservation Day

December 14 is designated as the National Energy Conservation Day in India.

About

It was introduced in 1991, by the Bureau of Energy Efficiency (BEE) under the Ministry of Power. It serves as a reminder of the vital role energy plays in our lives and the urgency of conserving it.

National Energy Conservation Awards (NECA):

Instituted in 1991. These awards honour the efforts of industrial units, and establishments that have significantly reduced energy consumption while maintaining their operational efficiency. Each year the Awards are presented on 14th December.

DECEMBER 18

1. About Birhor Tribe

Birhor is a Particularly Vulnerable Tribal Group (PVTG). **PVTGs are a sub-classification of Scheduled Tribes (STs) identified as being more vulnerable and marginalized than other tribal groups**. They are semi-nomadic and depend on forest resources for survival. They are skilled rope makers, using fibers from the bark of the 'chota nagpur' tree. They speak **Birhor, a language from the Munda group of the Austroasiatic language family**. Their language is similar to Santali, Mundari, and Ho languages. They are mainly found in **Jharkhand, but also in parts of Odisha, Chhattisgarh, and West Bengal.**

2. The International Solar Alliance (ISA)

It is a **joint initiative between India and France, established at COP21 in Paris in 2015 to combat climate change through solar energy solutions**. Following a 2020 amendment, all UN member states can now join. Over 100 countries are signatories, with 90+ ratifying full membership. Its mission is to secure US$1 trillion in solar investments by 2030, reduce technology and financing costs, and promote **solar energy use in agriculture, health, transport, and power generation.**

3. Kerch Strait

The **Kerch Strait, situated between mainland Russia and Crimea**. It is a connection between the Black Sea and the Sea of Azov. It also separates the Kerch and Taman Peninsulas. It is a **key route for exports of Russian grain and is also used for exports of crude oil, fuel oil and liquefied natural gas.**

4. About Moldova

Moldova is a landlocked country in the northeastern Balkan region of Europe, bordered by Ukraine and Romania.

Its **capital is Chisinau**. The country is drained by rivers such as the Prut, Dniester, and Danube, and lies east of the Carpathian Mountains, with a well-developed network of streams and rivers flowing into the Black Sea.

5. Charak

Northern Coalfields Limited (NCL) has rolled out 'CHARAK'- "Community Health: A Responsive Action for Koylanchal".

About Charak

Aim: Providing free treatment for identified Life-Threatening diseases belonging to Economically Weaker Sections of Singrauli region in Madhya Pradesh.

Diseases covered: Malignancy, TB, HIV and related complications, Cardiovascular diseases, Organ Transplant, Liver disorders, sudden hearing loss, Acute Surgical Emergencies, Neurological Disorders, Accidental trauma, etc.

Northern Coalfields Limited

It is a **subsidiary of Coal India Limited (CIL), the largest coal-producing company in the world**. It was established in 1985 with the objective of managing and operating the coal mines in the Singrauli region. **NCL's operations are primarily located in the Singrauli coalfields, which span across the states of Madhya Pradesh and Uttar Pradesh.**

6. What is Idiopathic Pulmonary Fibrosis?

It is a **chronic and progressive lung disease that affects the tissue surrounding the air sacs (alveoli) in your lungs**. In IPF, this lung tissue becomes thick and stiff for unknown reasons. Over time, these changes cause permanent scarring (fibrosis) in the lungs. This makes it progressively harder to breathe and get enough oxygen into your bloodstream.

Symptoms: Shortness of breath (especially during exercise), Fatigue, Unexplained weight loss, Chest discomfort etc

Treatment: There's no cure for IPF but **Antifibrotic drugs like pirfenidone and nintedanib** slow the disease progression.

7. Manganese in Water is Causing Cancer

Context

A recent study highlighted that **Manganese (Mn) contamination of water is causing cancer in the Gangetic plains of Bihar.**

About

Manganese is the **fifth-most abundant metal on earth** that exists in the form of oxides, carbonates and silicates. It is a hard, brittle, silvery metal and is present in food, water, soil, and rock as a naturally occurring component.

Essential Trace

Element: Manganese plays a vital role in maintaining body homeostasis by supporting **metabolic processes, enzyme functions, and bone health.**

Toxicity Concerns: Excess consumption can cause severe health issues, including neurological disorders and cancer.

According to the Bureau of Indian Standards (BIS), the **acceptable limit for manganese in drinking water is 0.1 milligrams per liter (mg/L), and the permissible limit is 0.3 mg/L.**

8. What is Apiculture?

Apiculture refers to the **scientific study and management of bees and their colonies for the production of honey and other bee-derived products.** It involves keeping bees in artificial structures like wooden boxes with mesh screens to separate the hive, ensuring their safety and optimal productivity. **Bees are valuable not only for their products but also for their critical role in pollination.**

Benefits of Apiculture

➢ **Crop Productivity:** Bees play a significant role in pollinating crops, improving the yield and quality of crops like mustard, coconut, areca nut, lychee, and mango.

➢ **Biodiversity Conservation**: Bees support the reproduction of wild plants, which in turn sustains ecosystems and promotes biodiversity.

➢ **Economic Opportunities for Farmers:** Migratory beekeeping offers additional income sources for farmers.

Honey bees in India- India hosts more than 700 bee species, including four indigenous honey bees:

1. **Asiatic honey bee (Apis cerana indica),**
2. **Giant rock bee (Apis dorsata),**
3. **Dwarf honey bee (Apis florea),**
4 .**The stingless bee (sp. Trigona).**

Western honey bees (Apis mellifera) were introduced in India in 1983 to increase the country's honey yield.
Waggle dance and circle dance

Bees use two kinds of dances to communicate information: the waggle dance and the circle dance. The purpose of either dance is for some honey bees to communicate to others the location of a flower patch with more nectar or pollen.

1. One bee dances while the others watch it to figure out the directions.

9. What is Diamond Cooling Technology?

The **technology involves using diamond, the most thermally conductive material known, to manage and dissipate heat in electronic devices**. Diamonds efficiently pull heat away from critical components, improving performance and energy efficiency. This advanced cooling mechanism outperforms conventional cooling systems, such as bulky heat sinks or liquid cooling, enabling compact designs and sustainable operation.

Applications

➢ **AI servers:** The technology can reduce GPU hotspot temperatures by **10°–20°C and slash GPU fan energy consumption by 90%.**

➢ **Satellite communications:** Diamond cooling technology can lead to five to ten times faster data rates, increased reliability, and a 50% smaller form factor.

➢ **High-Power Electronics:** Used in devices with **Gallium Nitride (GaN)**-based components for efficient heat dissipation in power electronics, radar systems, and electric vehicles.

10. The Science and Heritage Research Initiative (SHRI)

It is a program which focuses **on heritage research, aimed at engaging experts from various fields to address cultural heritage issues through data capture, analysis, and technological solutions**. Its objectives include building capacity in human resources, promoting scientific research and development (R&D) for heritage conservation, safeguarding cultural knowledge and practices, and applying advanced technologies in preservation. **Key focus areas include the study of heritage materials, remote sensing for archaeological detection, non-invasive imaging techniques, innovations in textile conservation, and the development of new materials and tools for conservation.** The program also aims to advance research in tribal arts and conservation technologies.

11. About Olive Ridley Turtles

About: They are the **smallest and most abundant of all sea turtles found in the world.**

Scientific name: Lepidochelys olivacea; also known as the Pacific ridley sea turtle.

Major nesting sites in India: Rushikulya rookery coast (Odisha), Gahirmatha beach (Bhitarkanika National park) and the mouth of the Debi River.

Presence: Found in warm waters of the Pacific, Atlantic and Indian oceans.

Features: Known for their **unique mass nesting called Arribada**, where thousands of females come together on the same beach to lay eggs. These are **carnivores and feed mainly on jellyfish, shrimp** etc. The eggs hatch in 45 to 60 days, depending on the temperature of the sand and atmosphere during the incubation period.

Threats: Hunted for meat, shell and other anthropogenic factors like fishing trawlers etc.

Conservation Status:
IUCN Red List: Vulnerable
Schedule I of the Indian Wildlife (Protection) Act, 1972
CITES Appendix I
Steps Taken

➢ Operation Olivia of the Indian Coast Guard
➢ Mandatory use of Turtle Excluder Devices (TEDs) to prevent accidental killing.

12. Urban Heat island

An Urban Heat Island (UHI) is an area in which the **temperature is higher than in surrounding rural areas due to human activities and infrastructure.** UHI could lead to temperature differences of up to six degrees centigrade within a given area or neighbourhood. **An Urban Heat Island (UHI) is an area in which the temperature is higher than in surrounding rural areas due to human activities and infrastructure.** UHI could lead to temperature differences of up to six degrees centigrade within a given area or neighbourhood.

DECEMBER 19

1. About Supplementary Demands for Grants

Definition: The Supplementary Demand for Grants refers to an **additional funding request made by the government when the allocated funds for a particular purpose in the annual budget are insufficient or when a need arises for unforeseen expenditure during the financial year.** Governed under **Article 115 of the Indian Constitution**. Requires the approval of

Parliament and the necessary funds are drawn from the Consolidated Fund of India (CFI)

Purpose: To meet the additional requirements when funds sanctioned in the Annual Budget are inadequate. To cover expenses that were not anticipated at the time of the budget's approval.

Types of Supplementary Grants:

Supplementary Grant: For additional funds over and above the amount approved in the annual budget.

Excess Grant: Granted when money spent exceeds the amount sanctioned in the budget.

Token Grant: A small sum (₹1) is sought for the Parliament's approval to reallocate funds within different heads of accounts.

Advances from Contingency

Fund: For meeting urgent, unforeseen expenditures, later regularized through supplementary grants.

2. Banglar Bari Scheme

West Bengal Chief Minister launched the "Banglar Bari" scheme to provide houses for the rural poor in the State.

About

It is a **housing scheme funded completely by the West Bengal Government**. Under the scheme, a total of ₹1.20 lakh will be given to a family for constructing a house, of which ₹ 60,000 in the first instalment. However, **beneficiaries in some areas of Jangalmahal and Dargeeling hills will get ₹1.30 lakh.**

3. Credit Guarantee Scheme for e-NWR based pledge Financing (CGS-NPF)

In News

Union Minister Shri Pralhad Joshi launched the Credit Guarantee Scheme for e-NWR based Pledge Financing (CGS-NPF) with a corpus of Rs 1,000 crore for post-harvest finance for farmers.

About the scheme

It **aims to minimize distress selling by farmers by providing loans against electronic negotiable warehouse receipts (e-NWRs) for agricultural produce stored in accredited warehouses**. It is designed to instill confidence in banks to offer pledge finance against e-NWRs for farmers and traders who store produce in WDRA-registered warehouses.

Targeted Beneficiaries: The scheme mainly targets small and marginal farmers, women, SC/ST, and PwD

farmers, with minimal guarantee fees. MSMEs and FPOs also benefit

Loan Coverage: Loans up to Rs 75 lakh for small farmers will have an 80-85% guarantee, while loans up to Rs 200 lakh for MSMEs/FPOs/traders will have a 75% coverage under the scheme.

4. Search and Rescue Aid Tool (SARAT)

The INCOIS has developed a newer version of its own Search and Rescue Aid Tool (SARAT)

About SARAT

Developed by: Indian National Centre for Ocean Information Services (INCOIS) Aids Indian Search and Rescue (SAR) agencies, like the Indian Coast Guard, in search operations at sea.

First launched: 2016.

Updated version: SARAT 2 improves accuracy and usability based on feedback from extensive Coast Guard operations.

5. About INCOIS

Autonomous Organization: INCOIS operates as an autonomous organization under the Ministry of Earth Sciences (MoES) in India.

Location: It's **headquartered in Hyderabad, Telangana**.

Purpose: Continuously monitors the Indian Ocean using a network of buoys, tide gauges, and satellites. This data is used to provide a range of oceanographic information and forecasts.

6. How does the Arctic tundra store carbon?

In **typical ecosystems, carbon dioxide (CO_2) is absorbed by plants through photosynthesis and released back during decomposition** However, the **Arctic tundra's extreme cold significantly slows decomposition, causing plant and animal remains to remain frozen in permafrost—ground that stays frozen for at least two consecutive years**. This traps carbon for thousands of years, preventing its release into the atmosphere. Arctic soils currently store more than 1.6 trillion metric tonnes of carbon, making the region vital for the global carbon cycle.

7. Hydroxymethanesulphonate (HMS)

Hydroxymethanesulphonate

(HMS) is a harmful component and its formation, previously thought to occur only in clouds and fog. But recently it is found to occur in aerosols during winter,

when sulfur dioxide and formaldehyde react in the presence of liquid water.

Acidity Shift: The **acidity of PM2.5 changes rapidly in winter, due to the concentration of sulphate and ammonium ions,** making conditions more favorable for HMS production

Effect of the 2022 Fuel Ban: The ban on high-sulfur fuel led to a relative increase in ammonium ions in PM2.5, lowering the acidity and encouraging the formation of HMS.

Significance of recent study

The **study's findings are significant for understanding aerosol formation in cold regions and provide new insights into aerosol thermodynamics, with potential relevance for other cold, urban, and industrial areas globally.** While the study's findings are mainly applicable to cold regions, such as parts of the Himalayas or Andes, they provide valuable insights into how temperature changes affect air quality and chemical pathways, especially amid global warming.

8. About Wroughton's Free-Tailed Bat

Scientific Name: Otomops wroughtoni.

Characteristics: It has large forward-pointing ears, a naked face, and a prominent nostril pad. Its fur is dark brown on the back, with a white border on the flanks and forearms.

Habitat: Primarily found in the Western Ghats, India, with a single known breeding colony. Small colonies recorded in Jaintia Hills, Meghalaya, and a single individual sighted in Cambodia.

Ecological Role: It helps to regulate insect populations and assists in pollination of nocturnal plant species.

Conservation Status: It is classified as **Data Deficient on the International Union for Conservation of Nature (IUCN) Red List. In India the species is listed on Schedule I of the Wildlife (Protection) Act 1972.**

9. Persistent Organic Pollutants (POPs):

They are **organic chemical substances (carbon-based), widely used throughout the supply chain, in all kinds of products including pesticides, industry processes, etc**. These POPs do not break down easily and remain in the environment for decades, travel over great distances through water and wind and eventually remain in the food chains through bioaccumulation. They are **toxic to both humans and wildlife.**

A global treaty on POPs: The Stockholm Convention on POPs calls for reduction or elimination of releases of POPs globally. It was **entered into force in 2004**. Parties to the Convention commit to not produce or use the chemicals listed in its annexes. **To date, 185 countries have ratified the Stockholm Convention and 34 POPs are listed as 17 pesticides, 15 industrial chemicals, 7 unintentional by-products.**

10. Short neck clam:

The **economically valuable bivalve mollusc, known as the short-neck clam, is the major fishery resource of the brackishwater Ashtamudi Lake in Kerala**. It is a fast-growing species with a peak spawning season of December to February and has a maximum lifespan of around 3 years. It **attains sexual maturity in its first year at a shell length of 30 mm. It is India's first Marine Stewardship Council (MSC) certified fisheries**. The shells provide an extra income, as a mineral source used in cement production and to make carbide for use in welding. The clam shell also holds commercial importance being the raw material for the manufacture of calcium carbide and sand lime bricks. They are also used for lime burning for construction, in paddy field and fish farms for neutralizing acid soil and as slaked lime. The **clams are bought by a local factory, heat-treated, frozen and sold on to retailers and restaurants, with around 80% being exported to Vietnam, Malaysia and Thailand**. In recent years, the fishery of this clam has witnessed a drastic decline, threatening the livelihoods of thousands of fishermen who rely on this resource. **Reasons for its decline are environmental pollution, invasion of non-native species like the Charru mussel, and the impacts of climate change, including altered salinity and water temperature,etc.**

11. Baiga Tribe:

The **Baiga Tribe is one of India's Particularly Vulnerable Tribal Groups (PVTGs).** They primarily reside in **Chhattisgarh, Jharkhand, Bihar, Odisha, West Bengal, Madhya Pradesh, and Uttar Pradesh.**

Traditional Practices:

Livelihood: Traditionally semi-nomadic, they practised slash-and-burn cultivation, locally called "Bewar", and now depend mainly on minor forest produce.

Tattooing: This is integral to their culture, with specific tattoos designated for different body parts and age

groups. Tattoos are made using **kajal derived from Ramtilla seeds (Niger seeds).**

Mahua Tree: These are fermented and distilled to prepare an intoxicant, forming an essential part of their diet and culture.

Cultural Identity:

Bamboo: A vital resource used in their daily life.

Habitat Rights: The Baiga tribe is the first community in India to be granted habitat rights, reflecting their deep connection with forests.

Jodhaiya Bai's Contribution:

Jodhaiya Bai was pivotal in bringing international recognition to Baiga tribal art. She was honored with the Padma Shri in 2023 for her exceptional contribution to the field of arts. Her artwork, which portrays Baiga tribal culture on canvas, has been exhibited in multiple countries around the world.

12. Kisan Kavach:

It is **first-of-its-kind anti-pesticide bodysuit designed to protect farmers from the harmful effects of pesticide exposure.** The suit is intended to protect farm labourers from imbibing the pesticides they spray. Several of the common pesticides are potential neurotoxins and detrimental to health. It is developed by the **Biotechnology Research and Innovation Council (BRIC-inStem), Bangalore, in collaboration with Sepio Health Pvt. Ltd.**

Features:

The kit consists of a trouser, pullover, and a face-cover made of 'oxime fabric' that can chemically breakdown any of the common pesticides that get sprayed onto cloth or body during spraying operations. This prevents chemicals from leaching into the skin. The price per kit is ₹4,000.

Working: This Kisan Kavach fabric can deactivate pesticides upon contact through nucleophilic mediated hydrolysis, thereby preventing pesticide-induced toxicity and lethality. The kit retains its potency in a wide temperature range, under UV-light exposure and was protective even after 150 washes.

13. Directorate General of Commercial Intelligence and Statistics (DGCI & S):

It is the premier organization of Government of India for collection, compilation and dissemination of India's trade statistics and commercial information.

History:

The Organization traces its origin to a statistical branch established in the Finance Department of the Government of India way back in 1862. Sir William W. Hunter was the first DG of the DGCI & S or the Director General of Statistics as he was designated, back in 1871.

Functions:

It is entrusted with the work of collecting, compiling and publishing/disseminating trade statistics and various types of commercial information required by the policy makers, researchers, importers, exporters, traders as well as overseas buyers. It is the **first large scale data processing organization functioning as a nodal agency for Export & Import data in the country.** It also compiles and publishes the inland Trade Statistics covering inter-State movements of goods by rail, river and air on yearly basis.

It is headed by the **Director General, an Additional Secretary level officer of Indian Statistical Services (ISS).**

Nodal Ministry: It works under the Ministry of Commerce & Industry.

Headquarter: Kolkata

DECEMBER 20

1. Calyptocephallela gayi:

It is **one of the largest frogs in the world**, growing up to over 30 cm (1 foot) in length and weighing up to 1 kg (2.2 lbs). It is also known as **Helmeted Water Toad which hopped alongside dinosaurs and is considered a "living fossil".**

Appearance: It is a robust species with a broad head and large mouth. It is very large, and can reach a snout–to–vent length of up to 15.5 cm (6 in) in males and 32 cm (13 in) in females.

Habitat: They inhabit aquatic environments, such as lakes, rivers and ponds.

Distribution: They are found in the lowlands of Chile, up to 500 m in elevation.

Conservation Status

IUCN: Vulnerable

Threats: Factors such as **climate change, habitat interruption, environmental decline** and pollution have all caused the Helmeted Water Toad's numbers to dwindle.

2. Dark Comets:

They are **celestial bodies which lack the glowing tails (a typical feature of comets) and resemble asteroids**. They are often small, just a few meters to a few hundred meters wide. **They have less surface area for material to escape and form into the beautiful tails we see on typical comets**. But they are not asteroids due to their sudden accelerations. They often spin quite rapidly and disperse escaping gas and dust in all directions, making them less visible. They follow elongated, elliptical paths that bring them close to the Sun before sweeping back out to the farthest reaches of the Solar System. **The first indication of dark comets came in 2016, when asteroid 2003 RM exhibited unusual orbital deviations.** Since then, astronomers have confirmed the existence of dark comets, with a new study published which revealed 14 such objects. **These comets fall into two main categories: "outer dark comets," which have eccentric orbits and are larger, and "inner dark comets,"** which are smaller and closer to the Sun, with nearly circular orbits.

3. Varmam Therapy:

It is a unique and traditional healing modality within the Siddha system of medicine, has long been revered for its effectiveness in treating various health conditions. It is a drugless, non-invasive, simple therapy used in pain management. **Varmam is considered the vital life energy points, located in human body**. It has been **identified as 108 points by the Siddhas.** The therapy is particularly renowned for its ability to provide rapid relief for musculoskeletal pain, injuries, and neurological disorders. It is a **scientifically grounded therapeutic practice used to treat acute and chronic diseases, including stroke, arthritis, and trauma-related injuries.**

Significance of the achievement: It serves as a testament to the growing global recognition of Siddha medicine and its healing potential.

Siddha Medicine:

It is a traditional system of healing that originated in South India and is considered to be one of **India's oldest systems of medicine.** Literary evidences of the **Sangam Era state** the origin of this system to around 10,000 BC. The system was built on the **work of Siddhars, who were mostly from Tamil Nadu**. It is called the Siddha medical system because of this

4. Joint Parliamentary Committee (JPC):

It is an **ad-hoc body**, which acts as **a mini-Parliament to carry out detailed scrutiny of a specific matter within a specific time frame.** It is dissolved after its term ends or its task has been completed. It is set up **by the Parliament for a special purpose, like the detailed scrutiny of a subject or Bill.** It has members from both the Houses and from the ruling parties and the opposition. It is set up after one House of Parliament has passed a Motion and the other has agreed to it. The **members of the JPC are decided by the Parliament**. The mandate of a JPC depends on the Motion constituting it. **The recommendations of the JPC are not binding on the government.**

A few JPCs have earlier been set-up, having investigative powers:

- To examine matters relating to **Allocation and Pricing of Telecom Licenses and Spectrum.**
- On Pesticide Residues in and Safety Standard for Soft Drinks, Fruit Juice and other Beverages
- On **Stock Market Scam** and Matters Relating thereto
- To enquire into irregularities in Securities and Banking Transactions
- To enquire into **Bofors Contract**

5. National Green Tribunal (NGT):

NGT was established under the National Green Tribunal Act, 2010 for the efficient and timely disposal of cases related to **environmental protection, forest conservation, and natural resource management**. The principal bench is located in New Delhi, with additional benches in Bhopal, Pune, Kolkata, and Chennai.

Composition of NGT:
The Tribunal comprises:
Chairperson: A retired Supreme Court judge.
Judicial members: Retired High Court judges.
Expert members: Professionals with at least 15 years of experience in fields related to environment or forest conservation.
Structure of benches: Each bench includes at least one judicial member and one expert member to ensure balanced decision-making.

Powers and Jurisdiction of NGT:
Scope: NGT handles civil cases related to environmental issues and laws listed in **Schedule I of the NGT Act:**

➢ The Water (Prevention and Control of Pollution) Act, 1974.
➢ The Water (Prevention and Control of Pollution) Cess Act, 1977.
➢ The Forest (Conservation) Act, 1980.
➢ The Air (Prevention and Control of Pollution) Act, 1981.
➢ The Environment (Protection) Act, 1986.
➢ The Public Liability Insurance Act, 1991.
➢ The Biological Diversity Act, 2002.

Special powers:
Acts as an appellate authority for environmental cases. Operates on **principles of natural justice**, not bound by the Code of Civil Procedure, 1908. Mandated to resolve cases within six months of filing.

DECEMBER 21

1. VIRAASAT
Organizer: National Handloom Development Corporation Ltd (NHDC) under the Ministry of Textiles.
Focus: Celebrates the tradition of handloom and handicrafts while providing market access to weavers and artisans.
Unique products: Features Paithani, Kotpad, Kota Doria, Tangail, Pochampally, Kancheepuram, Thirubuvanam, Jamdani, Santipuri, Chanderi, Maheshwari, Patola, Moirangphee, Banarasi Brocade, Tanchoi, Bhagalpuri Silk, Bawan Buti, and Pashmina Sari.

National Handloom Day:
It **commemorates the Swadeshi Movement launched on 7th August 1905**, which encouraged indigenous industries, particularly handloom weavers. The **First National Handloom Day was held on 7th August 2015 in Chennai.**
Significance: It recognises the efforts and skills of the handloom weaving community and also aims to promote the handloom sector and enhance the livelihood of weavers.

2. Government Initiatives for the Handloom Sector:
➢ **National Handloom Development Programme (NHDP):** Aimed at the overall development of the handloom sector.

➢ **Raw Material Supply Scheme (RMSS):** Ensures the supply of essential raw materials to handloom weavers.
➢ **Weavers' MUDRA Loan/Concessional Credit Scheme:** Provides financial support to weavers.
➢ **Handloom Producer Companies:** Encourages the formation of producer companies to enhance the marketing and sales of handloom products.
➢ **Design Resource Centers (DRCs):** Offers design support to weavers to improve product quality and marketability.
➢ **One District One Product:** Promotes unique handloom products from each district

3. Pangolins:
Also called **scaly anteaters because of their preferred diet, pangolins are the most trafficked mammal in the world for their meat, scales and leather**. These solitary, primarily nocturnal animals, are easily recognized by their full armor of scales. A startled pangolin will cover its head with its front legs, exposing its scales to any potential predator. If touched or grabbed it will roll up completely into a ball, while the sharp scales on the tail can be used to lash out.
Species: There are eight species of pangolins, found across two continents:
Africa: Black-bellied pangolin, White-bellied pangolin, Giant Ground pangolin, and Temminck's Ground pangolin
Asia: Indian pangolin (Manis crassicaudata), Chinese, Philippine pangolin, and Sunda pangolin
All eight pangolin species are protected under national and international laws, and two are listed as Critically Endangered on the IUCN Red List of Threatened Species.

Features:
Armour: Pangolins have large keratin scales covering their skin, which serve as armour.
Behaviour: They are solitary, nocturnal, and primarily feed on ants and termites.
Self-defense: Pangolins can curl into a ball to protect themselves from predators.
Habitat: They inhabit a variety of environments, including tropical forests, grasslands, and areas close to human settlements.

4. Indian Pangolin:

Distribution: Found in **India, Bangladesh, Southern Nepal, Sri Lanka, and parts of Pakistan**.

Habitat: Adapted to various environments including deserts, tropical forests, and near human settlements.

Physical traits: The Indian pangolin has 13 rows of sharp, overlapping scales that vary in colour depending on its surroundings.

Conservation status:

IUCN Red List: Endangered

Wildlife (Protection) Act, 1972: Listed under Schedule I

CITES: Appendix I

5. Antibiotic Resistance (AR):

AR is a **type of antimicrobial resistance where bacteria evolve to withstand the effects of antibiotics, making infections harder to treat.** It occurs primarily due to genetic changes that allow bacteria to neutralize or evade drugs designed to kill them.

Key Findings of the Study:

Nanoplastics can transform Lactobacillus acidophilus, a beneficial gut microbiota, into a carrier of AR genes. These AR genes can be transferred to pathogenic bacteria, exacerbating the AR crisis. **Polyethylene terephthalate bottle-derived nanoplastics (PBNPs) facilitate the Horizontal Gene Transfer (HGT) of AR genes from E. coli to L. acidophilus**. HGT involves gene transfer across different bacterial species, unlike vertical gene transfer, which occurs from parent to offspring.

Mechanisms of AR Gene Transfer:

➢ **Direct Transformation Pathway:** PBNPs act as physical carriers, transporting AR plasmids across bacterial membranes. This facilitates direct gene transfer between bacteria.

➢ **OMV-Induced Transfer Pathway:** PBNPs induce oxidative stress, triggering an increased secretion of outer membrane vesicles (OMVs). These OMVs, loaded with AR genes, serve as potent vectors for gene transfer between bacterial species, including beneficial and pathogenic bacteria.

What are Nanoplastics?

They are solid particles of synthetic or heavily modified natural polymers, ranging in size from 1 nm to 1000 nm.

Types:

➢ **Primary Nanoplastics:** Intentionally produced for specific applications.

➢ **Secondary Nanoplastics:** Generated from the fragmentation of larger plastics, often released unintentionally into the environment.

6. GLP-1 Receptor Agonists:

Glucagon-Like Peptide (GLP)-1 receptor agonists mimic a hormone that regulates appetite and blood sugar levels, for managing obesity. By specifically binding to the key hormone GLP-1, it regulates blood glucose levels and lipid metabolism. This receptor and its agonists hold significant therapeutic potential, reshaping the treatment approaches for multiple diseases, including **diabetes, cardiovascular disorders, and neurodegenerative diseases.** GLP-1 agonists are most often injectable medications, meaning you inject a liquid medication with a needle and syringe. **The new class of GLP-1 receptor agonists, that included drugs such as semaglutide and tirzepatide, "have the potential to be transformative**. In medication terms, an agonist is a manufactured substance that attaches to a cell receptor and causes the same action as the naturally occurring substance.

What is GLP-1?

GLP-1 is a key hormone that plays an integral role in **regulating blood glucose levels, lipid metabolism, and several other crucial biological functions**. It is released by the intestines in response to food intake.

7. Northern giant hornet:

Scientific name: Vespa mandarinia. It is the largest hornet in the world, measuring up to 2 inches long.

Habitat: They are known for inhabiting the lower altitude forest and avoiding large plains and high-altitude regions.

Distribution: They are native to temperate regions in China, Korea, Japan, and India.

It is an invasive species which poses a significant threat to insects and native pollinators. It is **nicknamed as 'Murder hornets', can kill an entire beehive of honeybees in just 90 minute**s. The hornets then defend the hive as their own, taking the brood to feed their own young. They can sting through most beekeeper suits, delivering almost seven times the amount of venom as a honey bee. Moreover, they have the ability to sting multiple times. They mainly

feed on **native insects: butterflies, moths, dragonflies, bees, wasps, etc.**

Ecological impact: It preys on honey bees and poses an indirect threat to plants that depend on honey bees for pollination

8. National Tansen Samman:

It was **established in the year 1980 by the Madhya Pradesh Government in the name of Music Emperor Tansen**. It is the highest national music award in the field of Indian classical music. Awardees get an honorarium of five lakh rupees, citation plaque and a shawl-shriphal.

Who was Tansen?

He was a prominent **Indian classical music composer, vocalist and instrumentalist**. He first stayed under the shelter of Daulat Khan, son of Sher Shah Suri and then was appointed as the court singer of **King Ramchandra of Bandhavgarh.** Later, he became one of the Navaratnas (nine jewels) at the court of Akbar. **Akbar gave him the title** Mian, an honorific, meaning learned man. He is given credit for introducing some famous ragas viz. **Malhar, Todi and Darbari.**

DECEMBER 23

1. Free Trade Agreements (FTAs):

Definition: Free **Trade Agreements are comprehensive trade deals between two or more countries, aimed at reducing or eliminating trade barriers such as tariffs and import/export restrictions**. These agreements provide preferential access to markets by offering tariff concessions and lowering non-tariff barriers.

Key Features:

FTAs cover trade in goods (agricultural and industrial products) and trade in services (banking, IT, construction). Advanced FTAs may include chapters on **investment, intellectual property rights (IPRs), government procurement, and competition policy.**

Types of Trade Agreements:

Partial Scope Agreements (PSA): Focus on a limited number of goods.

Free Trade Agreements (FTA): Reduce tariffs between member countries while retaining individual tariff policies with non-members.

Customs Union: Includes a common external tariff for non-members.

Common Market: Facilitates free movement of goods, services, and factors of production.

Economic Union: Coordinates macroeconomic and exchange rate policies among member nations.

Major Trade Agreements of India:
India-ASEAN FTA, India-South Korea CEPA, and proposed agreements like India-UK and India-EU.

2. Automated & Intelligent Machine-aided Construction (AIMC)

AIMC (Automated & Intelligent Machine-aided Construction) is an **advanced system being implemented by the Ministry of Road Transport & Highways (MoRTH) for efficient National Highway construction**. It integrates intelligent machines and real-time data sharing to expedite construction and enhance road quality.

Objective of AIMC

To increase **productivity, ensure durable and long-lasting roads, and reduce dependency on traditional surveys post-construction.** To tackle challenges such as outdated technologies, uncoordinated data, and poor contractor performance that lead to project delays.

Types of AIMC Machines:

GPS-Aided Motor Grader (3D Machine Control Technology): It uses Global Navigation Satellite System (GNSS) data and angle sensors to position the grader's blade with precision. Processes data in real-time to ensure alignment with digital design plans.

Intelligent Compaction Roller (IC Roller): It assists in minimizing post-construction consolidation. Reduces air pockets or water voids in materials, preventing damage to roads.

Single Drum/Tandem Vibratory Roller: It ensures proper soil and base layer compaction for road stability.

Current Network: India's National Highway network spans 46 lakh km, with 3,000 km of high-speed corridors.

Future Vision: By 2047, the Ministry aims to expand the network by an additional 45,000 km, ensuring a robust and efficient infrastructure system.

3. Hydroxychloroquine

Drug Profile: Hydroxychloroquine is a medication primarily used to **treat malaria, rheumatoid arthritis, and systemic lupus erythematosus (SLE).** It reduces immune system activity or kills the malaria-causing parasites from Anopheles mosquito bites.

Use in Autoimmune Disorders:

Effective in managing rheumatoid arthritis by reducing joint inflammation. Helps treat lupus by controlling the overactive immune response.

HCQ and COVID-19:

Early studies claimed HCQ could reduce SARS-CoV-2 viral loads, especially in combination with azithromycin. Proposed as a prophylactic to prevent COVID-19 infection; however, large-scale use raised concerns due to:
Cardiac arrhythmia risks
Liver damage
Potential weakening of the immune system's response to infection.

4. Quantum Satellite

Definition: A quantum satellite is a communications satellite that uses quantum physics to secure its signals.
Purpose:
➢ **Enhance Signal Security:** Protect against threats from quantum computing.
➢ **Facilitate Quantum Key Distribution (QKD):** Enable unbreakable encryption through QKD.
➢ **Quantum Cryptography and Quantum Key Distribution (QKD):**
➢ **Quantum Cryptography:** Uses the principles of quantum physics to secure messages.

Quantum Key Distribution (QKD):

Function: Securely share encryption keys such that any eavesdropping can be detected, aborting the transmission if compromised.
Mechanisms:
➢ **Quantum Measurement:** Measuring a photon changes its state, thus revealing any eavesdropping.
➢ **Quantum Entanglement:** Entangled photons instantly reflect changes in one another, ensuring secure key distribution.

National Quantum Mission (NQM):

Objective: The NQM is a program by the Department of Science & Technology designed to accelerate the use of quantum physics in developing advanced communication and sensing systems.
Budget and Duration: The Union Cabinet approved it in April 2023, with a budget of ₹6,000 crore, to be implemented from 2023 to 2031.
Micius: The world's first quantum communications satellite was launched by China in 2016.
Function: Acts as the source of pairs of entangled photons, whose properties remain intertwined regardless of the distance.
Significance: This entanglement forms the basis of the most secure forms of quantum cryptography.

5. Sahitya Akademi Awards:

It is awarded for the most outstanding books of literary merit published in any of the major Indian languages recognised by the Akademi. **Along with the 22 languages enumerated in the Constitution of India, the Sahitya Akademi has recognised English and Rajasthani as languages** in which its programme may be implemented. The authors and poets will receive a plaque, a shawl and an amount of ₹1 lakh in an award.

Key facts about the Sahitya Akademi:

It was **formally inaugurated by the Government of India on 12 March 1954**. It was registered as a society under the Societies Registration Act, 1860. It is the central institution for literary dialogue, publication and promotion in the country and the only institution that undertakes literary activities in **24 Indian languages, including English**.
Ministry: An autonomous organization under the Ministry of Culture.
Head office: New Delhi

6. Dinga Disease:

It is **locally called 'Dinga Dinga', meaning 'shaking like dancing'.** It is predominantly impacting women and girls, is characterized by fever and excessive body shaking. It is severely impairing mobility and in severe cases people are also experiencing paralysis. The **cause of Dinga Dinga remains a mystery**. Despite efforts to identify the virus responsible, health experts have yet to pinpoint its source.

The symptoms of Dinga Dinga are as unusual as they are distressing:

➢ **Uncontrollable body shaking:** The most striking feature of the illness is violent, involuntary movements that resemble dancing.
➢ **Fever and extreme weakness:** Patients often report high fever and overwhelming fatigue.
➢ **Paralysis-like immobility:** Some experience a sensation of paralysis, with even basic movements like walking becoming impossible.
➢ **Treatment:** The illness is currently being treated with antibiotics.

7. SMILE Programme

The **Indian government and the Asian Development Bank (ADB) signed a landmark $350 million policy-based loan under the second subprogramme of the Strengthening Multimodal and Integrated Logistics Ecosystem (SMILE) programme.** The Strengthening Multimodal and Integrated Logistics Ecosystem (SMILE) is a programmatic policy-based loan (PBL) to support the government in undertaking wide-ranging reforms in the logistics sector in India. The programmatic approach comprises two subprograms, which aim to expand India's manufacturing sector and improve the resilience of its supply chains. This **initiative is in collaboration with the Department of Economic Affairs (DEA) under the Ministry of Finance, the Department for Promotion of Industry and Internal Trade (DPIIT) under the Ministry of Commerce and Industry, and ADB.**

Key pillars of the programme:

➢ **Strengthening institutional frameworks:** Developing capacities at national, state, and city levels for the seamless integration of multimodal logistics infrastructure.
➢ **Standardising warehousing:** Establishing uniform standards to streamline supply chains and attract private investment.
➢ **Improving trade logistics:** Enhancing the efficiency of India's external trade operations.
➢ **Promoting smart, low-emission systems:** Leveraging advanced technologies to boost efficiency while reducing environmental impact.

DECEMBER 24

1. Green Deposits

Green deposits are **interest-bearing fixed-term deposits where proceeds are allocated specifically towards green finance**. These deposits are denominated only in Indian Rupees as per the Reserve Bank of India (RBI) framework.

Purpose: Funds raised through green deposits are directed towards sustainable and environmentally friendly projects such as:

➢ **Renewable energy projects** (solar, wind, biomass, and hydropower).
➢ **Energy efficiency and clean transportation**.
➢ Climate change adaptation and sustainable water/waste management.
➢ Development of **green buildings and coastal/marine environment projects**.
➢ Support for certified organic farming.

Key features: Like regular fixed deposits, green deposits offer interest and fixed tenure. Fund allocation is subject to an annual third-party audit to ensure compliance with green finance norms. Deposits are insured under the Deposit Insurance and Credit Guarantee Corporation (DICGC)

Priority Sector Lending (PSL): If the green activities/projects financed align with PSL guidelines, they can be classified under the priority sector.

2. Similipal Tiger Reserve (STR)

Location: Situated in Mayurbhanj District, in the northernmost part of Odisha. Surrounded by high plateaus and hills, the highest peaks are **Khairiburu and Meghashini (1515 meters above sea level).**

Designation: Declared a **Tiger Reserve in 1956 and included under Project Tiger in 1973**. Recognised as part of the World Network of Biosphere Reserves by UNESCO in 2009.

Terrain: The landscape is undulating and hilly, interspersed with open grasslands and wooded areas.

Vegetation: A mix of forest types, with Northern tropical moist deciduous forests dominating, alongside semi-evergreen patches.

Notably, it is the **only place in the world home to melanistic tigers (black tigers).**

Flora: Features an astounding 1078 plant species, including 94 species of orchids.

Sal is the dominant tree species.
Fauna: Hosts a diverse array of wildlife, including:

Large Mammals: Leopard, Gaur, Elephant, Barking Deer, Spotted Deer, and Sloth Bear.
Small Mammals: Langur, Mongoose, Pangolin, Flying Squirrel, and Porcupine.
Reptiles: Python, Monitor Lizard, and Turtle.
Birds: Several bird species inhabit the reserve.
Cultural importance: Home to various tribes, including Kolha, Santhala, Bhumija, Bhatudi, Gondas, Khadia, Mankadia, and Sahara.

3. SpaDeX Mission:

The Space Docking Experiment (SpaDeX) is a groundbreaking mission by the **Indian Space Research Organisation (ISRO) aimed at developing autonomous space docking technology**. The mission involves PSLV-C60 as the launch vehicle to demonstrate in-space docking technology using two small spacecraft: **Chaser (SDX01) and Target (SDX02).** This technology is a critical milestone for future lunar missions, the development of the **Bharatiya Antariksh Station (BAS), and other advanced space endeavours.**

Mission Overview:
Launch vehicle: PSLV-C60.
Orbit: 470 km circular orbit at a 55-degree inclination.
Separation dynamics:
Target and Chaser spacecraft will separate with an initial velocity difference to achieve 10-20 km inter-satellite separation. Propulsion systems will be used to align both spacecraft into the same orbit, achieving Far Rendezvous.
Docking and demonstration: After docking, the mission will demonstrate electrical power transfer before undocking for payload operations.

What is POEM?
PSLV Orbital Experimental Module (POEM):
Developed by **Vikram Sarabhai Space Centre (VSSC).** Repurposes the fourth stage of PSLV into an orbital station for scientific experiments. First used in the PSLV-C53 mission (2022) to minimize space debris. Equipped with a **Navigation Guidance and Control (NGC) system for attitude stabilization**
Historical Context
The concept of space docking was first achieved by the Soviet Union in 1967 with the docking of Kosmos 186 and Kosmos 188. SpaDeX positions India as a potential fourth country globally to master space docking technology.

4. Panama Canal:

It is a **man made waterway that connects the Atlantic and Pacific oceans across the Isthmus of Panama**. It is owned and administered by Panama, and it is 40 miles long from shoreline to shoreline. It was built by **the Unites states and completed in August 1914,** it is one of the two most strategic artificial waterways in the world, the other being the Suez Canal. **From its opening in 1914 until 1979, the Panama Canal was controlled solely by the United States, which built it.** In 1979, however, control of the canal passed to the Panama Canal Commission, a joint agency of the United States and the Republic of Panama, and complete control passed to Panama at noon on December 31, 1999. It is a sophisticated, highly-engineered system which uses a system of locks and elevators to take ships from one end to the other. This is needed because the **two oceans that the Panama Canal connects do not lie at the same elevation, with the Pacific slightly higher than the Atlantic**. This difference means that for a ship entering the canal through the Atlantic, it needs to gain elevation during its journey to the Pacific. This is achieved using a lock system which lifts and drops vessels to the required sea level at either end of the canal. Basically, locks are either flooded (to gain elevation) or drained (to lose elevation), and act as water elevators. In total, the system comprises three sets of locks — **12 locks in total — which are serviced using artificial lakes and channels.**

5. Aerogel:

Aerogels are among the lightest solid materials. They are created by combining a polymer with a solvent to form a gel, and then removing the liquid from the gel and replacing it with air.
Properties: They are extremely porous and very low in density and they offer advantages like adjustable surface chemistry They are **also known as 'solid air' or 'frozen smoke' are excellent adsorbents (a solid substance used to remove contaminants)** and are incredibly lightweight solids composed mostly of air. Aerogels are most preferred in environment and oil spill clean up, for insulation purposes

6. Key facts about the newly developed Hybrid Aerogel

Researchers have designed and synthesised aerogel: the sponge-like absorbents, light in weight and porous synthetic materials for this purpose. The aerogel's unique structural composition was treated with iron nitrate salts and maintained at room temperature for about two to five minutes. This specially designed aerogel was found to be effective in extracting and retrieving upto 99 per cent of gold ions from the e-waste. In daylight, the hybrid aerogel could extract 1689mg/gram of e-waste and 2349mg / gram under blue light. As there were dual processes involved, that of adsorption and reduction — the quality of the recovered gold was reasonably pure thereby reducing the need for further purifying processes.

7. What is a Dark Pattern?

The **Department of Consumer Affairs is launching 'Jago Grahak Jago App,' 'Jagriti App,' and 'Jagriti Dashboard" for public use on National Consumers Day 2024 to protect Consumers from the Dark Patterns**. Dark patterns are defined as any deceptive design patterns using user interface/user experience interactions on any platform. **The term was coined by Harry Brignull in 201**0. They are designed to mislead or trick users to do something they originally did not intend or want to do; it is done by subverting or impairing the consumer autonomy, decision making or choice; amounting to misleading advertisement or unfair trade practice or violation of consumer rights. **The Central Consumer Protection Authority notified the Guidelines for Prevention and Regulation of Dark Patterns in 2023 and specified 13 dark patterns, namely: False urgency, Basket Sneaking, Confirm shaming, forced action, Subscription trap, Interface Interference, Bait and switch, Drip Pricing, Disguised Advertisements and Nagging, Trick Wording, Saas Billing and Rogue Malwares.**

8. Key points about 'Jago Grahak Jago App,' 'Jagriti App,' and 'Jagriti Dashboard'

These are part **of an intelligent cyber-physical system, which operates in real-time and runs on the Airawat AI Supercomputer under the National Supercomputing Mission for AI and Data Analytics**. This innovative system analyses existing text and design elements on e-commerce platforms to determine whether they are being used to influence consumer psychology.

Jago Grahak Jago App: It **provides essential e-commerce information about all URLs during a consumer's online activities**, alerting them if any URL may be unsafe and requires caution.

Jagriti App: It allows users to report URLs where they suspect the presence of one or more dark patterns declared illegal. **These reports are then registered as complaints to the Central Consumer Protection Authority (CCPA)** for possible redressal and subsequent action.

Jagriti Dashboard: It is used to generate real-time reports on e-commerce URLs for the presence of the aforementioned dark patterns, enhancing the capability to monitor and regulate online consumer interactions effectively.

Significance: This solution will aid the CCPA in identifying dark patterns, speeding up the resolution of consumer disputes and will go a long way in curbing practices that are detrimental to consumer interests.

9. Miyawaki

DECEMBER 26

1. Lion-tailed Macaque:

It is an **endangered primate species endemic to the evergreen rain forests in the Western-Ghats of India** with its range passing through the three states of **Karnataka, Kerala and Tamil Nadu**. Also known as **wanderoo, it is an Old World monkey**. **Old World monkeys are primates in the family Cercopithecidae.** They include baboons, red colobus and macaques. It is

an arboreal and diurnal creature, they sleep at night in trees (typically, high in the canopy of rainforest). It is **territorial and very communicative animal**. One of the distinguishing features of this species is that males define the boundaries of their home ranges by calls. **Overall, their communication system contains as many as 17 vocalisations. They are divided into to two sub populations by a gap of about 40 km in the mountains at Palghat in Kerala**. It is an omnivorous and feed upon a wide variety of food, although fruits form the major part of their diet. The magnificent Lion-tailed macaque is named due to its lion-like, long, thin, and tufted tail. Also, they are characterised by the grey mane around their face. In the meantime, **this animal is one of the smallest macaque species in the world.**

Conservation Status:
IUCN: Endangered
CITES: Appendix I
The Wildlife (Protection) Act, 1972:Schedule I
Threats: It is most threatened of the primates, endemic to the Western Ghats. Its population faces threats from habitat loss, fragmentation and human encroachment.

2. Annual Survey of Unincorporated Sector Enterprises

Recently, the **Ministry of Statistics and Programme Implementation (MoSPI) has released the results of Annual Survey of Unincorporated Sector Enterprises (ASUSE) for 2023-2**4. It is carried out with the primary objective of measuring various economic and operational characteristics of unincorporated non-agricultural establishments in manufacturing, trade and other services sectors (excluding construction). The survey collects data on various economic characteristics of this sector including number of workers, GVA, emoluments paid, fixed asset owned, outstanding loan, besides, different types of operational characteristics such as type of ownership, nature of operation, registration status, use of ICT, etc.

Significance: The data serves as a **key input for policymaking, supporting National Accounts Statistics**, fulfilling the requirements of Ministries such as **M/o Micro, Small and Medium Enterprise (MSME), Textiles, Labour & Employment, and empowering stakeholders to make informed, data-driven decisions.**

Key highlights:
The **ASUSE 2023-24 results highlight significant growth in establishments, employment, and productivity in the unincorporated non-agricultural sector**. The total number of establishments in the sector increased substantially from 6.50 crore in 2022-23 to 7.34 crore in 2023-24, representing a healthy 12.84% growth. **Among the broad sectors covered, the number of establishments in the "Other Services" sector recorded a growth of 23.55% followed by a 13% increase witnessed by the manufacturing sector**. During the same period, the Gross Value Added (GVA) which is a key indicator of economic performance rose by 16.52% driven by a 26.17% growth in other services sector. The percentage of female-owned proprietary establishments has increased from 22.9% in 2022-23 to 26.2% The average emolument per hired worker also increased by 13% in 2023-24 compared to the previous year, 2022-23, signaling improvements in wage levels. **Percentage of establishments using internet has also grown significantly from 21.1% in 2022-23 to 26.7% in ASUSE 2023-24.**

3. Archaea:

Archaea, which means **"ancient things" in Greek**, are one of the oldest forms of life on Earth and belong to a group called the third domain of life. **Archaea (singular archaeon) are a primitive group of microorganisms**. They were originally discovered and described in extreme environments, such as **hydrothermal vents and terrestrial hot springs**. They were also found in a diverse range of highly saline, acidic, and anaerobic environments. These **slow-growing organisms are also present in the human gut (about 1–2% of the microorganisms in the human gut),** and have a potential relationship with human health. They are **known for producing antimicrobial molecules**, and for anti-oxidant activity with applications in eco-friendly waste-water treatment. Archaea are extremely difficult to culture due to challenges in providing natural conditions in a laboratory setting.

4. Greenland:

It the **world's largest (non-continent) island, located between the continents of North America and Europe in the North Atlantic Ocean**. It is geographically considered a part of the North American continent. It is surrounded by the Arctic Ocean to the north; by the Greenland Sea to the east; by the North Atlantic Ocean

to the southeast; Davis Strait to the southwest and Baffin Bay to the west. **Greenland was once a Danish colony and is now an autonomous province of Denmark.**

Climate: Greenland is in the polar zone, where winter temperatures reach as low as -50°C and summer temperatures rarely exceed 10–15°C. Due its size, however, temperatures can vary considerably from one part of the country to another.

Highest Point: Gunnbjorn's Fjeld

Capital: Nuuk

Why it matters to USA?

Its **strategic importance rose during the Cold War, and the US has a large air base there, the Pituffik Space Base, earlier the Thule Air Base**. From Greenland, the US can monitor and prevent any missile coming towards it from Russia, China, or even North Korea. **Greenland is rich in rare earth minerals**, which are used in mobile phones, electric vehicles and other consumer electronics, but also in bombs and other weapons.

As global warming leads to melting of ice, new waterways can open in the Arctic region, and all major powers are keen to boost their presence here.

5. Pradhan Mantri Rashtriya Bal Puraskar:

It is organized to celebrate the energy, determination, ability, zeal and enthusiasm of our children. It is the highest civilian honor for children in India. The **Pradhan Mantri Rashtriya Bal Puraskar organized by the Ministry of Women and Child Development Government of India** It is awarded annually to children for exceptional achievements in seven categories: **Art & Culture, Bravery, Innovation, Science & Technology, Social Service, Sports, and Environment.**

Eligibility: A child should be an Indian Citizen. A child above the age of 5 years and not exceeding 18 years (as of 31st July of respective year). The act/incident/achievement should have been within 2 years of the last date of receipt of application/nomination for the year of consideration. **Number of Award will be 25**, however, any relaxation to this maximum number may be permitted at the discretion of the National Selection Committee. Each awardee will receive a medal, certificate and citation booklet.

6. Governor:

The **Governor in India is the chief executive head of a State**. It is based on the **Canadian model as an independent constitutional authority.** The Governor is appointed by the President of India under her/his warrant and seal, not elected directly or indirectly**. S/he holds office at the pleasure of the President but enjoys independence in her/his role.** Emoluments, allowances, and privileges are determined by Parliament Conventionally (not a constitutional obligation), the President consults the Chief Minister of the concerned State to ensure smooth governance.

Supreme Court Judgments:

Surya Narain v. Union of India (1982): The pleasure of the President is not justiciable.

Hargovind Pant v. Raghukul Tilak (1979): The Governor's office is an independent constitutional office and not an employment under the Central government.

Protections and Immunities:

Under **Article 361, the Governor enjoys personal immunity from legal liability for official acts**. Criminal proceedings are not allowed during their tenure, and they cannot be arrested or imprisoned.

Oath of Office: The Governor takes an oath to:
Faithfully execute the office.
Preserve, protect, and defend the Constitution.
Serve the well-being of the State's people.
Administered by the Chief Justice of the concerned state's High Court.

7. National Human Rights Commission (NHRC): It is a statutory body responsible for the protection and promotion of human rights in India. It ensures the protection of life, liberty, equality, and dignity of individuals. It enforces rights guaranteed by the Constitution of India and international covenants within the jurisdiction of Indian courts. It was established on **12th October 1993 under the Protection of Human Rights Act (PHRA), 1993.**

Amended by: Protection of Human Rights (Amendment) Act, 2006.

Human Rights (Amendment) Act, 2019.

Aligned with the **Paris Principles for promoting and protecting human rights, adopted by the UN in 1993.**
Composition: The NHRC comprises: Chairperson (a former Chief Justice of India or Supreme Court Judge).

Five full-time members and seven deemed members from statutory commissions.

Appointment and Tenure:

Selection process: The Chairperson and members are appointed by the President of India on recommendations of a six-member Selection Committee, comprising:

Prime Minister (Chairperson)

Speaker of the Lok Sabha.

Deputy Chairman of the Rajya Sabha.

Leaders of the Opposition in both Houses of Parliament.

Union Home Minister.

The Chairperson and members hold office for a three-year term or until the age of 70, whichever is earlier.

Roles and Functions:

It **possesses the powers of a civil court for conducting judicial proceedings**. It can summon witnesses and demand evidence. It may utilise the services of central/state officers or investigative agencies. It **investigates human rights violations within one year of their occurrence.** It makes recommendations to government authorities regarding human rights violations and safeguards.

8. Kilauea Volcano:

It is located in the **southern part of Hawaii's Big Island, within Hawai'i Volcanoes National Park, U.S.**A. It is the youngest and most active Hawaiian shield volcano, renowned for frequent eruptions. It erupts from vents at its summit caldera or along rift zones.

Mythological Significance: The central crater, Halemaumau, is believed to be the home of the Hawaiian fire goddess Pele.

Historical Activity:

Contained a lava lake until 1924. Nearly continuous activity was recorded in the 19th and early 20th centuries. **34 eruptions since 1952; near-continuous eruptions occurred from 1983 to 2018 in the East Rift Zone.**

Key Features:

Summit Caldera: Kilauea's summit caldera, a large depression formed by the partial collapse of the volcano after releasing most of its magma chamber, spans approximately 3 miles in length and 2 miles in width, covering an area of over 4 square miles.

Proximity to Mauna Loa: Kilauea's slopes seamlessly merge with those of Mauna Loa, another massive shield volcano, making the region home to the summits of two of the world's most active volcanoes.

9. What is a Shield Volcano?

It is a **type of volcano characterized by broad, gentle slopes formed from highly fluid basalt lava.**

Features:

Unlike conical peaks of composite volcanoes, **shield volcanoes appear elongated and dome-shaped**. Eruptions are usually low in explosivity, forming cinder cones and spatter cones at vents**. Explosions occur only if water enters the vent.**

Examples: Hawaiian shield volcanoes like Kilauea and Mauna Loa.

Volcanoes in India:

Barren Island (Andaman Islands): India's only active volcano.

Narcondam (Andaman Islands): Dormant volcano.

Baratang (Andaman Islands): Known for mud volcanoes.

Deccan Traps (Maharashtra): Vast volcanic plateau formed by ancient eruptions.

Dhinodhar Hills (Gujarat): Extinct volcano.

Dhosi Hill (Haryana): Ancient volcanic site with historical significance.

DECEMBER 27

1. Viksit Panchayat Karmayogi Initiative:

It is **part of the broader 'Prashasan Gaon Ki Aur' campaign**. It **aims to enhance the capacity and competence of Panchayati Raj Institutions (PRIs)** by equipping elected representatives and officials with the tools and knowledge required for effective governance and participatory planning. It is **currently piloted in Odisha, Assam, Gujarat, and Andhra Pradesh.** The initiative leverages e-learning platforms, AI-powered chatbots, and mobile apps to bridge knowledge gaps and enhance service delivery. **This program aligns with the government's broader mission to decentralize governance and foster participatory decision-making at the grassroots level**. The initiative is expected to create scalable models of citizen-centric governance, enabling PRIs to drive

equitable and sustainable development across rural India.

2. Lesotho:

It is an **enclaved nation located within the territory of South Africa**. It has a population of about 2.3 million and a per capita Gross Domestic Product (GDP) of $878.0 in 2023. It is **classified as a lower middle-income country**. It is primarily highlands, with its lowest point 1,400 meters above sea level. It is the only independent state in the world that lies entirely above 1,400 m in elevation. **Thabana Ntlenyana, at 3,482 metres, is the highest mountain of Lesotho and the southern Africa.** The Orange River at about 2,100 km in length is one of the longest rivers in Africa. It rises in the Lesotho Highlands as the Sinqu River. **Previously a British protectorate, it gained its independence in 1966.** It is a constitutional monarchy, ruled by a King as Head of State, and governed by a 33-member Senate and a 120-member National Assembly. **Maseru is the capital and largest city of Lesotho.**

3. Golden Visa programme:

It is a residence by investment plan, which grants **temporary residency to foreign nationals in exchange for a significant donation or investment in real estate, business, or other fields is known as a "Golden Visa."** High-net-worth individuals (HNWIs) often physically relocate to favorable jurisdictions through golden visa schemes, granting them complete legal residency rights, including the facility to live, work, study, and receive healthcare in that nation.

Spain's Golden Visa programme:
Introduced in **2013**, it allowed non-European Union citizens to obtain residency permits by investing a minimum of €500,000 in Spanish real estate.

Reasons for terminating the programme: It cited the need to address rising property prices and ensure housing availability for local citizens, particularly in major cities. The programme was used for **money laundering and tax evasion.**

4. Red Panda

Two red pandas from Rotterdam Zoo, Netherlands are being brought to **Padmaja Naidu Himalayan Zoological Park (PNZP) in Darjeeling for conservation breeding purposes**. It is a **small arboreal mammal found in the forests of India, Nepal, Bhutan, and the northern mountains of Myanmar and southern China**. It thrives best at 2,200-4,800 m in mixed deciduous and conifer forests with dense understories of bamboo, though red panda evidences have also been found at 1800 m. In India, it is found in **Sikkim, Arunachal Pradesh and Darjeeling and Kalimpong districts of West Bengal.** Almost 50% of the red panda's habitat is in the Eastern Himalayas. It is considered an indicator species for ecological change.
Conservation Status:
IUCN Red list: Endangered
CITES: Appendix I
Wildlife Protection Act 1972: Schedule I

5. Padmaja Naidu Himalayan Zoological Park:

It is located **West Bengal**. It hosts the country's most successful conservative breeding programme for red pandas. The planned conservation breeding programme began in **1986 as a part of the Global Captive Breeding Masterplan.**

6. Hydrothermal Vents:

Hydrothermal vents are **underwater hot springs** near tectonic plate boundaries, expelling hot water and minerals from beneath the Earth's crust into the ocean. They were **first identified in 1977 near the Galapagos Islands, Ecuador.**

Formation:

Cold **seawater (around 2°C) seeps through fissures in the oceanic crust near tectonic activity**, The water then contacts hot magma, heating to temperatures up to 370°C or higher, Superheated water then resurfaces as mineral-rich hydrothermal fluids, forming vents and plumes.

Types:

Black Smokers: Emit particle-laden fluids, primarily containing iron sulfides, forming black chimney-like structures

White Smokers: Emit fluids rich in barium, calcium, and silicon, forming white chimneys

7. Marburg Virus Disease (MVD)

Rwanda has successfully contained and declared its first-ever outbreak of Marburg Virus Disease (MVD) officially over after a 42-day period without new cases. This achievement was confirmed by the World Health Organization (WHO). MVD is a severe and often fatal hemorrhagic fever caused by the Marburg virus, with no approved vaccines or treatments currently available. **It was first identified in 1967 in the German city of Marburg**. It is named after an outbreak linked to laboratory workers exposed to infected green monkeys imported from Uganda.

Geographical spread: Most outbreaks have occurred in sub-Saharan Africa, including countries like Tanzania, Uganda, Angola, Ghana, Kenya, and Zimbabwe.

Transmission: Initially transmitted from fruit bats (Rousettus aegyptiacus) to humans. It can spread through direct contact with bodily fluids of infected individuals or contaminated surfaces.

Symptoms:

Early signs: High fever, severe headache, and malaise.

Advanced stage: Severe bleeding, liver failure, multi-organ dysfunction, shock, and death within 8-9 days of symptom onset.

Fatality rate: The average case fatality rate is approximately 50%, varying from 24% to 88% depending on the virus strain and case management.

Diagnosis: Confirmed through RT-PCR (Reverse Transcription Polymerase Chain Reaction) tests and virus isolation procedures that require maximum biohazard containment.

Treatment: No specific treatment exists. Supportive care includes rehydration, electrolyte replacement, and symptom management, improving survival chances.

Vaccine development: Promising vaccines, such as the Sabin Vaccine Institute's single-dose vaccine, are under Phase 2 trials in **Uganda and Kenya**. Rwanda also received investigational vaccines to support outbreak control.

Key Facts About Rwanda:

It is a **landlocked country in East-Central Africa, referred to as the "Land of a Thousand Hills".**

Borders: Burundi, Tanzania, Uganda, and the Democratic Republic of the Congo.

Rivers: The Nile and Congo rivers flow through Rwanda.

Capital City: Kigali.

DECEMBER 30

1. Kaveri Engine:

The **Kaveri engine project began in the late 1980s with the goal of powering the Light Combat Aircraft (LCA) Tejas.** It has been developed by the Gas Turbine Research Establishment under the Defence Research and Development Organisation.

Features:

The current version of the Kaveri engine produces approximately 49-51 kN of thrust. **This thrust level is suitable for UAV applications like the Ghatak, India's stealth UCAV program.** The DRDO plans to integrate an afterburner to increase the thrust to 73-75 kN for more demanding scenarios. The Kaveri engine has undergone extensive ground testing, modifications, and enhancements over the years. It **has been tested in high-altitude simulations in Russia and ground trials in India.** These tests demonstrated promising results in reliability, thrust output, and operational stability, meeting the required performance metrics for inflight testing.

Significance: This signifies a major step for India's self-reliance in aero-engine technology, particularly for unmanned aerial vehicles (UAVs) like the **Ghatak stealth UCAV program.**

2. SVAMITVA Scheme:

The **Survey of Villages and Mapping with Improvised Technology in Village Areas (SVAMITVA) is a central sector scheme, launched in 2020**. It was launched with

a vision to enhance the economic progress of rural India by providing 'Record of Rights' to households possessing houses in inhabited areas in villages through the latest surveying drone technology. The **scheme seeks to achieve the following objectives: To bring financial stability to the citizens in rural India by enabling them to use their property as a financial asset for taking loans and other financial benefits**. Creation of accurate land records for rural planning. Determination of property tax, which would accrue to the GPs directly in States where it is devolved or else, add to the State exchequer. Creation of survey infrastructure and GIS maps that can be leveraged by any department for their use. To support the better-quality Gram Panchayat Development Plan (GPDP) by making use of GIS maps. To reduce property related disputes and legal cases.

Nodal Ministry: The Ministry of Panchayati Raj (MoPR) is the Nodal Ministry for implementation of the scheme.

3. United Nations Disengagement Observer Force

It was **established by UN Security Council Resolution 350 (1974) on 31 May 1974** immediately following disengagement of Forces Agreement between Israel and Syria.

Mandate: To **maintain the ceasefire and supervise the area of separation — a demilitarized buffer zone — as well as the area of limitation** — where Israeli and Syrian troops and equipment are restricted — in the Golan. The mandate of the mission is regularly renewed every six months and it has been extended till June 2025.

Method of financing: UNDOF is funded through a separate account approved on an annual basis by the UN General Assembly.

India is the top third troop and police contributing countries to this mission.

Headquarter: Camp Faouar, Syria

Key points about Golan Heights

It is a **hilly area overlooking the upper Jordan River valley on the west**. It is a Syrian territory occupied by Israel since 1967.

Borders: It is bounded by the Jordan River and the Sea of Galileeon the west, Mount Hermon on the north, the seasonal Wadi Al-Ruqqād River on the east, and the Yarmūk River on the south.

4. Wealth Tax:

Wealth Tax is levied on the **net market value of various assets owned by an individual, such as cash, bank deposits, shares, fixed assets, personal cars, and real property.** Globally, several countries like France, Portugal, and Spain impose wealth tax. The primary objective of the tax is to target unproductive and non-essential assets of individuals.

Wealth Tax in India:

Introduction: The **Wealth Tax Act was introduced in 1957 based on the recommendations of the Kaldor Committee (1955) as a part of tax rationalization measures**. It imposed a 1% tax on earnings exceeding ₹30 lakh per annum for individuals, Hindu Undivided Families (HUFs), and companies.

Abolition: Abolished in 2015 due to issues such as Extensive litigation, Increased compliance burden, and High administrative costs. Replaced by an increase in the surcharge on the super-rich.

Replacement measures: The surcharge for individuals with income exceeding ₹1 crore and companies with income over ₹10 crore was increased from 2% to 12%.

Other Relevant Economic Concepts:

Tobin Tax: A tax on financial transactions, especially currency exchanges.

Pigovian Tax: Levied to correct negative externalities (e.g., pollution tax).

Laffer Curve: Demonstrates the relationship between tax rates and tax revenue.

Tax-GDP Ratio: Indicates the tax revenue as a percentage of GDP, critical for fiscal analysis.

5. Heliobacter pylori:

It is a **common type of bacteria that grows in the digestive tract of human and tends to attack the stomach lining.** It is adapted to live in the harsh, acidic environment of the stomach. It **infects a person usually during childhood**. Its infections are usually harmless, but they are responsible for most ulcers in the stomach and small intestine, called peptic ulcers.

Infections with pylori affect over 43 percent of the world's population with a wide range of **gastrointestinal disorders, including peptic ulcers, gastritis, dyspepsia and even gastric cancer.**

How it survives in stomach?

This **bacterium can change the environment around it and reduce the acidity so it can survive more easily**. The spiral shape of pylori allows it to penetrate the stomach lining, where it's protected by mucus and the body's immune cells cannot reach it. When **signs or symptoms do occur with pylori infection, they are typically related to gastritis or a peptic ulcer and may include: An ache or burning pain in stomach (abdomen), Nausea, loss of appetite and unintentional weight loss etc.**

Treatment: It can be treated with a combination of antibiotics and a proton-pump inhibitor. This treatment is sometimes referred to as triple therapy. The proton pump inhibitor includes esomeprazole, lansoprazole, omeprazole, pantoprazole, rabeprazole sodium.

Antibiotics includes clarithromycin, metronidazole, amoxicillin.

6. JIGYASA program:

It was **launched in 2017 by Council of Scientific & Industrial Research (CSIR).** It is also known as CSIR Jigyasa program. It aims to promote curiosity and scientific temperament as part of Scientific Social Responsibility (SSR). **CSIR Jigyasa Virtual Lab (CJVL) is an extension of CSIR Jigyasa program. The objective of Jigyasa is to extend the classroom learning by focusing on well-planned research laboratory-based learning for school students**. To bring in quality with value added research knowledge, CSIR laboratories collaborate with Kendriya Vidyalayas (KVS), Navodaya Vidyalayas (NVS), Karnataka State S&T Academy (KSTA), Atal Innovation Mission (AIM), Niti Aayog, Indian Institute of Technology Bombay, etc. Under this programme the target audience for the Virtual Lab platform is students of the standard VI to XII (11-18 years) who would like to explore science using different activities, experienced researchers and faculties on the subjects of Science, Mathematics, Biology and IT.

7. National Rainfed Area Authority:

It is an expert body to provide the much-needed knowledge inputs regarding **systematic upgradation and management of country's dry land and rainfed agriculture. The NRAA has a two tier structure.**

Governing Board: It provides necessary leadership and appropriate coordination in implementation of programmes. The Governing Board is chaired by Union Minister of Agriculture and co-chaired by Union Minister of Rural Development.

Executive Committee: It consists of technical experts and representatives from stakeholder Ministries. The Executive Committee is headed by a full time Chief Executive Officer who should be a recognized expert on the subject.

The **CEO will be supported by five full-time technical experts.** The Authority is serviced by the Ministry of Agriculture and is located at Delhi.

Mandate:

Water conservation and covers all aspects of sustainable and holistic development of rainfed areas, including appropriate farming and livelihood system approaches. Issues pertaining to landless and marginal farmers, who constitute the large majority of inhabitants of rainfed areas, are to be addressed by the Authority.

Nodal Ministry: Ministry of Agriculture & Farmers Welfare

8. Fishing Cat:

The **Fishing cat (Prionailurus viverrinus) is a medium-sized wild cat. It** is a solitary and nocturnal hunters that rest during the day amongst dense vegetation and then at night head to the water to find food. They are very strong swimmers and can swim large distances, often while pursuing a fish.

Appearance: It is a "small" cat of medium size and stocky build, with short legs, a short tail, and a face that is round but elongated. **Females are noticeably smaller than males**.

Habitat: They live primarily in wetland areas, swamps, and marshy areas around oxbow lakes, reed beds, tidal creeks, and mangrove forests.

Distribution: They are mainly found in Southeast Asia, including **Sri Lanka and parts of Pakistan, in western India to southern China, Java, and Sumatra.**

Conservation Status:

IUCN: Vulnerable

CITES: Appendix II

Wildlife Protection Act 1972: Schedule I

9. Biodiversity Credits

A **biodiversity credit is a verifiable, quantifiable, and tradeable financial certificate rewarding positive biodiversity outcomes, such as the conservation or restoration of species, ecosystems, and natural habitats.** They are gaining attention as a mechanism to finance biodiversity conservation and achieve the targets under the Kunming-Montreal Global Biodiversity Framework (KMGBF). **The KMGBF, established during the 15th Conference of Parties (CoP15) of the Convention on Biological Diversity (CBD), aims to promote biodiversity conservation, sustainable use of natural resources, and equitable benefit-sharing.**

Key features: It represents a specific amount of land or marine habitat conserved or restored over a fixed period Credits are generated by non-profits, governments, landowners, or companies and sold to private entities to fulfill biodiversity commitments.

Examples of Biodiversity Credit
Schemes: Terrasos, GreenCollar, ValueNature, Credit Nature, Wilderlands.

Market Overview:
Current Market Value: Estimated at $8 million (World Economic Forum).
Future Projections: Expected to grow to $2 billion by 2030 and $69 billion by 2050.

10. Biodiversity Credit Alliance (BCA):

It is a voluntary international alliance supporting the implementation of the Kunming-Montreal Global Biodiversity Framework. **Focuses on Targets 19(c) and 19(d) of the frameworks**.

Targets under KMGBF:
Target 19(c): Businesses must monitor, assess, and disclose their biodiversity risks, dependencies, and impacts.
Target 19(d): Businesses must provide consumers with information to encourage sustainable consumption patterns.
Mission: To develop a biodiversity credit market with science-based principles to guide conservation efforts.

Governance:

Secretariat: Facilitated by UNDP and UNEP Finance Initiative (UNEP FI).
BCA Task Force:
Decision-making body comprising methodology developers, standard setters, academic institutions, and representatives from Indigenous Peoples and Local Communities (via the Communities Advisory Panel).

11. Baltic Sea

NATO to enhance **military presence in Baltic Sea after undersea power and internet cables cut.**
About the Baltic Sea
It is the **youngest sea on Earth**, formed 10,000-15,000 years ago as glaciers retreated at the end of the last Ice Age. It is located in Northern Europe, enclosed by Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden. It is **one of the largest bodies of brackish water on the planet (Earth), connected to St. Petersburg by the Gulf of Finland.**

12. PM CARES Fund

The Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund (PM CARES Fund) received Rs 912 crore in contributions during the financial year 2022-23.
About
The PM CARES Fund was registered as a **Public Charitable Trust under the Registration Act, 1908 in 2020**. It was established in the wake of the Covid-19 pandemic.
Objective: Dealing with any kind of emergency or distress situation, like posed by the COVID-19 pandemic, and to provide relief to the affected.
Governance: The **Prime Minister is the ex-officio chairman of the PM CARES Fund,** while the Defence Minister, Home Minister and Finance Minister are ex-officio trustees of the Fund. It is not a part of the government budget, and its workings are separate from the government's direct financial control.
Tax Benefits: Donations to PM CARES Fund would qualify for 80G benefits for 100% exemption under the Income Tax Act, 1961.
Donations will also qualify to be counted as Corporate Social Responsibility (CSR) expenditure under the Companies Act,

13. About the Smart Cities Mission (SCM)

It is a **Centrally Sponsored Scheme launched in 2015**. It covers **100 cities and is being implemented by**

the Ministry of Urban Development (MoUD) and all state and union territory (UT) governments. Originally slated for completion by 2019-20, the SCM has been extended to 31 March 2025, with 91% of projects completed as of November 2024.

Objective & Significance: To promote cities that provide core infrastructure and give a decent quality of life to their citizens, a clean and sustainable environment and application of 'Smart' Solutions. Make **Cities liveable, inclusive, sustainable (Area-based development). Create employment opportunities.**

14. About Panama Canal

The Panama Canal is an **82-km (51-mile) artificial waterway connecting the Pacific and Atlantic Oceans, saving ships thousands of miles and weeks of travel.**

Construction History: Spanish colonizers studied the canal in the 1530s, and after a failed French attempt, the U.S. took over in 1903, after supporting Panama's independence. The U.S. paid Panama $10 million and an annual annuity for the canal's construction and administration, which led to the canal's opening in 1914.

Importance: It shortens travel time for ships, such as the journey from Los Angeles to New York, by about 8,000 miles (22 days) compared to the southern route around South America.

U.S. Control and Handovers: Tensions grew over U.S. control, especially after the 1956 Suez Crisis. In 1977, the Carter-Torrijos Treaty granted Panama full control of the canal by 1999.

Recent Developments: Climate change and droughts have lowered water levels, limiting transits in the canal.

15. Khwaja Moinuddin Chishti

Early Life: Moinuddin was a revered Sufi saint, born in 1141 CE in Persia (modern-day Iran) and believed to be a descendant of Muhammad.

Spiritual Training: Khwaja Moinuddin received formal education in Bukhara and Samarkand, centers of Islamic learning.

After encountering the mystic Ibrahim Qandozi, he set out on a spiritual journey. He was later initiated into the Chishti Sufi order by Khwaja Usman Harooni near Herat. In 1192 CE, Moinuddin arrived in Ajmer, during the decline of the Chauhan dynasty following its defeat by Muhammad of Ghor.

Disciples: Khwaja Moinuddin's teachings were carried forward by prominent disciples like Qutbuddin Bakhtiyar Kaki, Baba Fariduddin, Nizamuddin Auliya, and Chirag Dehalvi.

Contributions and Teachings

Promotion of Sufi Values: Khwaja Moinuddin propagated Sufism as a devotional and ascetic path within Islam. He emphasized divine love, service to humanity, and equality, transcending religious boundaries.

Interfaith Harmony: By engaging with Hindu mystics and sages, he fostered a spirit of mutual respect and understanding, rejecting religious orthodoxy. He earned the title "Garib Nawaz" (friend of the poor) for his selfless service.

Legacy: Mughal Emperor Akbar revered Moinuddin and made pilgrimages to his shrine.

16. Current Account Deficit

India's current account deficit (CAD) marginally moderated to $11.2 billion, equivalent to 1.2% of gross domestic product (GDP), during the July-September 2024 quarter.

Current Account Deficit (CAD)

The **current account deficit occurs when a country's imports of goods and services exceed its exports**. It is a crucial indicator of a nation's economic health and reflects the balance of trade, net income from abroad, and net current transfers.

Components of CAD

➢ **Trade Balance:** The difference between the value of exports and imports of goods.

➢ **Services:** Includes software exports, travel, and other service receipts.

➢ **Net Income:** Comprises interest, dividends, and remittances.

➢ **Net Transfers:** Includes private remittances from expatriates.

Significance of lower CAD

Economic Stability: It reduces vulnerabilities to global economic shocks, such as changes in commodity prices or interest rates in advanced economies.

Reduced External Debt: With a lower CAD, India borrows less from foreign sources to bridge its deficit, keeping the external debt-to-GDP ratio manageable.

Global Confidence: A low CAD boosts India's credibility in global financial markets, enhancing its credit rating

DECEMBER 31

1. Exercise Surya Kiran:

It is a **joint military exercise between the Indian army and Nepal army**. It is an annual event, conducted alternately in both countries. It aims to enhance interoperability in **forest warfare, counter-terrorism operations in mountains, and Humanitarian Assistance and Disaster Relief under the United Nations Charter**. Through various war games, both sides seek to improve their operational capabilities, refine their combat skills, and strengthen their coordination to operate together in challenging scenarios. The exercise will provide a platform for soldiers from India and Nepal to exchange ideas and experiences, share best practices, and foster a deeper understanding of each other's operational procedures.

18th Edition:

It is scheduled to take place in **Saljhandi, Nepal**. The Indian Army contingent is being led by a battalion from the 11th Gorkha Rifles, while the Nepal Army will be represented by the Srijung Battalion.

2. What is Denmark Strait Cataract?

The Denmark Strait cataract, an underwater giant, defies conventional understanding of waterfalls, influencing global ocean circulation and shaping ecosystems, despite its invisible and silent presence. It is **the largest waterfall on Earth, situated in an underwater channel between Iceland and Greenland**. It is over three times the height of the Angel Falls, the world's tallest land-based waterfall, which stands at just over 979 metres. Stretching across the width of the Denmark Strait, the cataract spans roughly 480 kilometres. **Despite its size, the Denmark Strait cataract remains concealed beneath the waves and undetectable from the surface.**

Formation: It was formed during the last Ice Age, approximately 17,500 to 11,500 years ago.

3. Rooppur Nuclear Power Plant:

It is a nuclear power plant under construction in **Iswardi, Pabna District, Rajshahi Division, Bangladesh.** It will be **Bangladesh's first source of nuclear power**. **Bangladesh Atomic Energy Commission (BAEC) is the owner of the Rooppur nuclear plant**. It features two VVER-1200 reactors, created by Russian company Rosatom. Construction of both water-cooled reactors began in November 2017. **Once completed, the two reactors at the Rooppur site, some 160 kilometres northwest of the capital, Dhaka, will generate 2400 megawatts of power**, providing approximately 9 percent of Bangladesh's total electricity needs. The total estimated cost of the Rooppur nuclear plant is $12.65 billion US dollars. The construction is largely funded by a loan from Russia, to be paid back over 20 years.

4. International Day of Epidemic Preparedness:

It is annually observed on **December 27 to advocate the importance of prevention of, preparedness for, and partnership against epidemics.** It highlights the urgent need to invest in systems that can prevent, detect, and respond to infectious disease outbreaks. **The first-ever International Day of Epidemic Preparedness, held on 27 December 2020, was called for by the United Nations General Assembly** to advocate the importance of the prevention of, preparedness for, and partnership against epidemics.

What is an Epidemic?

An epidemic is a **sudden disease outbreak that affects a large number of people in a particular region, community, or population.** In an epidemic, the number of people affected by the disease is larger than what is normally expected.

Yellow fever, smallpox, measles, and polio are prime examples of epidemics. An epidemic disease doesn't necessarily have to be contagious. For example, West Nile fever and the rapid increase in obesity rates, both are considered epidemics.

5. Kamarajar Port

The **Minister for Ports, Shipping and Waterways recently said cargo-handling capacity at Indian ports increased by 87 percent in the last nine years, with Tamil Nadu's Kamarajar Port registering a whopping swell of 154 percent**. Kamarajar Port, formerly known as Ennore Port, is in Tamil Nadu. It is the **12th major port of India and the first port in India which is a public company.** It is the **only corporatized major port and is registered as a company**. The port is owned by Chennai Port Trust, which also operates the Port of Chennai. **The port works in a landlord port model**. The landlord port is characterized by its mixed public-private orientation. Under this model, the port authority acts as a regulatory body and as a landlord, while port operations (especially cargo handling) are carried out by private companies. The port has terminals for handling coal, LNG, containers, and multipurpose cargo. **Coal is the main cargo shipped through Kamarajar Port.**

6. GPS Spoofing:
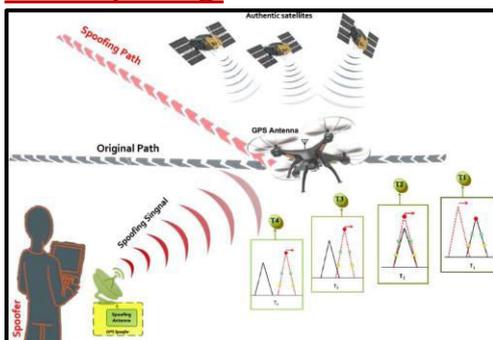
GPS spoofing, also known as **GPS simulation, refers to the practice of manipulating or tricking a GPS receiver by broadcasting false GPS signals**. Essentially, it misleads the GPS receiver into believing it is located somewhere it is not, resulting in the device providing inaccurate location data. **This form of cyberattack undermines the reliability of GPS data, which is vital for a variety of applications, from navigation to time synchronization and more.**

How Does GPS Spoofing Work?
It **exploits the inherent vulnerabilities in the GPS infrastructure – the weak signal strength of GPS satellites. The Global Positioning System (GPS) functions by sending signals from satellites to GPS receivers on Earth**. These receivers then calculate their position based on the time it takes for these signals to arrive. However, due to the weak signal strength of the GPS satellites, these signals can be easily overwhelmed by fake signals, resulting in inaccurate location data on the receiving device. Typically, a GPS spoofer begins by acquiring a basic understanding of the victim's GPS setup, including the types of signals it uses and how they are processed. With that information, **the attacker then sends counterfeit GPS signals that mimic the real ones. These fake signals are stronger, causing the receiver to recognize them as authentic signals**. As a result, the victim's GPS receiver ends up processing these counterfeit signals, leading to erroneous location information.

7. Sambar Deer:

It is a **large deer species native to the Indian subcontinent and Southeast Asia.**
Scientific Name: Rusa unicolor
In Nepal it is referred to as the Jarao and in China as the Four-eyed deer. **Sambar deers are water-dependent so they are never found far from water.** They can be found also in a broad range of forest habitats - **dry**

deciduous forest, rainforest and mixed forests. They live alone or in small groups.

Features:

A large, relatively long-tailed deer, it stands 1.2–1.4 m (47–55 inches) at the shoulder. It is **the largest oriental deer, with some adult males reaching 550 kg in weight.** The coat forms a ruff around its neck and is an unspotted, dark brown in colour. The male sambar bears long, rugged antlers with three points, or tines. They are **quite elusive and are most active at dusk and at night.**

IUCN Red List: Vulnerable

8. Teesta River:

It is a **Himalayan River flowing through Sikkim and West Bengal in India and Rangpur in Bangladesh**. It is a tributary of Brahmaputra. This river forms a boundary between Sikkim and West Bengal.

Course:

It rises in the **Himalayas Chunthang in Sikkim, flows to the south, cutting a deep gorge through the Siwalik Hills east of Darjiling in West Bengal, and turns southeast to run through the Sivok Khola pass onto the plains of West Bengal.**

Originally, the river continued southward to empty directly into the upper Padma River (Ganges River). About 1787, however, the river changed its course to flow eastward, crossing the Rangpur region of Bangladesh to join the Jamuna River near Chilmari after a total course of about 200 miles (320 km). **The flow of the Tista is greatest during the summer (June to September), when the monsoon rains are the heaviest and glacier supply abundant meltwater**. Its lower reaches are marked by flooding and frequent, violent course changes; navigation is impaired by shoals and quicksand near the junction with the Jamuna.

Major tributaries:

Left-bank: Lachung Chhu, Chakung Chhu, Dik Chhu, Rani Khola, Rangpo Chhu.

Right-bank: Zemu Chhu, Rangyong Chhu, Rangit River.