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India's Climate Action Efforts and Commitments

Why in News? India submitted its 4th Biennial Update Report (BUR-4) to the UNFCCC on 30th December 2024.

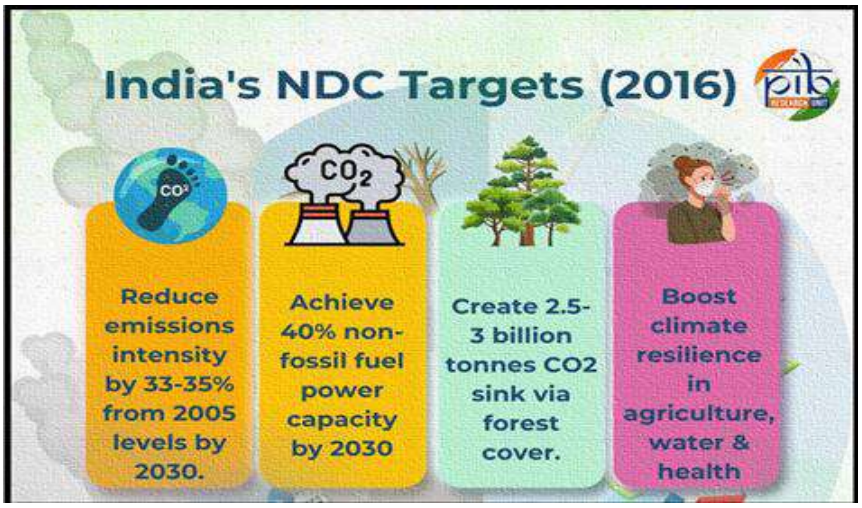
India's Climate Goals:

- **Net-Zero Target:** Achieve net-zero emissions by 2070 (announced at COP26 in 2021).
- **Progress:** India reported a **7.93% reduction in GHG emissions** in 2020 compared to 2019 in its **4th Biennial Update Report (BUR-4)**.

Key Climate Action Frameworks:

UNFCCC Goals:

- Stabilize GHG concentrations.
- Limit global temperature rise to well below **2°C, aiming for 1.5°C.**



India's Long-Term Strategy (LT-LEDS):

- Focused on **seven strategic transitions** including low-carbon electricity, sustainable transport, urban adaptation, decoupling growth from emissions, CO2 removal, enhancing forest cover, and financial pathways.

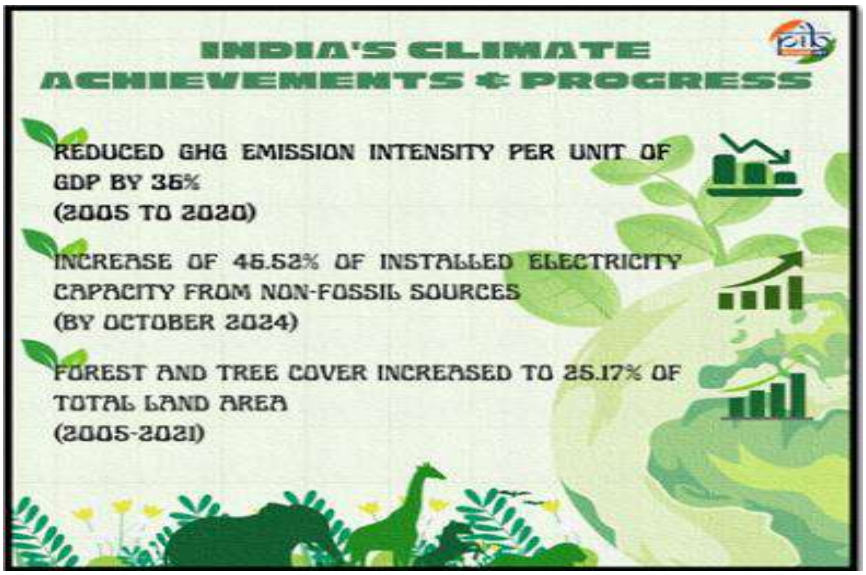
Key Achievements and Facts:

- **India's Historical Emissions:** Annual share only **4% of global cumulative** emissions (1850-2019).
- **Energy Consumption:** Per capita primary energy consumption in 2019 was **28.7 GJ**, significantly below global averages.

- **Net Emissions (2020):** Including Land Use, Land-Use Change, and Forestry (LULUCF): **2,437 million tonnes CO2e**.

Major Initiatives:

- **Forest Conservation and Afforestation:**
- **Compensatory Afforestation:** For non-forest land use, including eco-restoration measures.
- **Green Credit Program (2023):** Plantation on degraded lands for green credits.
- **National Afforestation Programme (NAP):** Community-driven afforestation in degraded areas.



Urban Climate Adaptation:

- Integrating climate adaptation into urban planning (Smart Cities Mission, AMRUT, PMAY).
- Promoting energy and resource efficiency in urbanization.

Air Pollution Control:

- **National Clean Air Programme (NCAP):** City-specific action plans for 131 cities.
- Measures include cleaner fuels, ethanol blending, and BS-VI norms.

Coastal Ecosystem Conservation:

- **MISHTI (2023):** Mangrove restoration covering 540 km² in 9 states and 4 UTs.
- **Integrated Coastal Zone Management Plans (ICZMP):** Protection strategies for Gujarat, Odisha, and West Bengal.

Regulatory Measures:

- **Coastal Regulation Zone (CRZ) Notifications:** Focused on managing mangroves, coral reefs, and critical ecosystems (2011 & 2019).

Significant Programs and Policies:

- **"Ek Ped Maa Ke Naam" Campaign:** Nationwide tree plantation drive (2024).
- **Funding Initiatives:** Support through schemes like **SBM (Urban), SATAT, and FAME-II** for clean air and transportation.

India's climate efforts reflect its **commitment to equity**, **sustainability**, and **global cooperation** under the Paris Agreement.

Aravali Safari Park Project

Why in News: The **Haryana government's** ambitious **Aravali Safari Park Project** aims to create the **world's largest safari park**. However, the project has faced significant opposition since its inception.

Key Features of the Project:

- The park will span **3,858 hectares** (approximately **10,000 acres**) across the **Gurugram** and **Nuh** districts.
- **Proposed facilities include:**
  - Animal cages,
  - Guest houses,
  - Hotels,
  - Restaurants,
  - Auditoriums,
  - Animal hospital,
  - Children's parks,
  - Botanical gardens,
  - Aquariums,
  - Cable cars,
  - Tunnel walk with exhibits,
  - Open-air theatre,
  - Eateries.

Concerns About the Project:

1. **Increased Tourism in Ecologically Sensitive Area**:
   Experts argue that the project focuses on boosting **tourism** rather than **conserving** the **Aravalli mountain range**. The increased footfall, **vehicular traffic**, and **construction** could damage the **aquifers** beneath the Aravallis, which are crucial for the **water-starved districts** of **Gurugram** and **Nuh**.
2. **Legal Protection**:
   The project's location falls within a **"forest"** area, protected under the **Forest Conservation Act, 1980**. This law prohibits activities such as **tree cutting**, **land clearing**, and **real estate development** in such areas.
3. **Poor Forest Cover in Haryana**:
   Haryana has a very low **forest cover** of only **3.6%**. Experts suggest the state should focus on **rewilding natural forests** rather than initiating **destructive safari projects**.
4. **Artificial Park Debate**:
   Some experts question the need for an **artificial park** in a natural habitat. In an environment like the **Aravallis**, where wildlife thrives, the concept of **zoo safaris with cages and enclosures** seems unnecessary.

Aravalli Range-

The **Aravalli Range** is a **mountain range** in **western India**, and it is one of the **oldest mountain ranges** in the world, with origins dating back to the **Proterozoic era**.

- The range runs for approximately **670 km** from the **north-east** to the **south-west**.
- It starts near **Delhi**, passes through **southern Haryana**, **Rajasthan**, and extends into **Gujarat**.
- **The range is divided into two sections**:
  - **Sambhar-Sirohi ranges**,
  - **Sambhar-Khetri ranges**.

Ecological Importance:

- The Aravalli range plays a crucial role in combating **desertification** by preventing the **Thar Desert** from spreading into **eastern Rajasthan**.
- It acts as an **aquifer**, with its fractured and weathered rocks allowing water to percolate and recharge the **groundwater**.

Natural Resources:

- The Aravallis are rich in **minerals** such as **rock phosphate**, **lead**, **zinc**, **silver**, **talc**, **pyrophyllite**, and **asbestos**.

- **Guru Shikhar**, located on **Mount Abu**, is the **highest peak** of the **Aravalli range**.

What is Glacier Retreat?

Why in News ? The loss of 110 glaciers in the eastern Himalayas of Arunachal Pradesh over the last 32 years (1988-2020) underscores the growing issue of glacier retreat in the region, which has significant implications for the hydrology and climate of the area. The reasons for this rapid glacier retreat can be understood through a combination of natural and human-induced factors:

Reasons for Glacier Retreat:

1. **Climate Change:**
    - **Global Warming:** Rising global temperatures are a primary factor behind the melting of glaciers worldwide, including in the Himalayas. As average temperatures rise, glaciers are unable to maintain their mass, leading to retreat.
    - **Increased Rainfall:** Changing rainfall patterns, with higher rainfall and more intense storms in the monsoon season, contribute to glacier melt. Rainwater accelerates the melting of snow and ice compared to snow or hail.
2. **Changes in Precipitation Patterns:**
    - Shifting monsoon patterns and reduced snowfall during winters are diminishing the accumulation of ice on glaciers. This makes it harder for glaciers to recover and grow, leading to an overall loss of glacier mass.
3. **Air Pollution:**
    - Increased air pollution, especially black carbon (soot), settles on glaciers and ice sheets, reducing their albedo (reflectivity). This causes the glaciers to absorb more heat from the sun, accelerating the melting process. The Himalayas, being close to major industrial regions in South Asia, are increasingly affected by this pollution.
4. **Human Activity:**
    - **Deforestation:** Deforestation around glacier-fed rivers and mountains can exacerbate the impacts of climate change by reducing the ability of the environment to regulate temperatures and moisture levels.

- **Urbanization and Infrastructure Development:** The expansion of infrastructure in the Himalayan region, such as roads and hydropower projects, disrupts local ecosystems and increases the pressure on glaciers.

5. **Glacial Lake Formation:**
    - Melting glaciers create glacial lakes that are susceptible to outburst floods (GLOFs). As glaciers melt, they retreat further, and the resulting glacial lakes can overflow, causing flash floods downstream, which also accelerates glacier loss.

What is Glacier retreat ?

Glacier retreat refers to the process in which a glacier shrinks, or recedes, over time due to the melting of ice at the glacier's terminus (the lower end of the glacier) faster than the rate at which it is replenished by snowfall or ice accumulation. This retreat is often a clear indicator of climate change, as it is usually driven by rising temperatures and changes in precipitation patterns.

Implications of Glacier Retreat:

- **Water Availability:** Glaciers in the eastern Himalayas are a crucial source of freshwater for the region. As they retreat, the long-term availability of water for millions of people in India and neighboring countries will be impacted, especially in the form of river flow from glacier-fed streams.
- **Hydropower Projects:** Many hydropower projects in the region depend on glacial meltwater for generating electricity. The reduction in the volume of water may impact their capacity and efficiency.
- **Agriculture and Livelihoods:** Reduced water availability can affect agriculture, particularly in regions that rely on glacial meltwater for irrigation. It can also exacerbate existing issues of water scarcity.
- **Climate Change Feedback Loop:** As glaciers retreat, the overall albedo of the region decreases, leading to further warming and a vicious cycle of accelerated glacier melt.

Major Glaciers in India and the Lakes/National Parks around Them:

1. **Siachen Glacier (Ladakh):**
    - The Siachen Glacier, one of the largest glaciers in the world outside the polar regions, is located in the Karakoram range of the northernmost part of India. It is a critical source of freshwater for the Nubra and Shyok rivers.
    - **Siachen Glacier and the Surrounding Area:** The area around Siachen is protected as part of a military zone, but its region is also near some wildlife

reserves such as the **Hemis National Park**, which is known for the rare snow leopard.

2. **Gangotri Glacier (Uttarakhand):**
    - Located in the Garhwal Himalayas, the Gangotri Glacier is the source of the Ganges River. It holds both religious and ecological significance.
    - **Gangotri National Park:** Located in the vicinity of the Gangotri Glacier, this park is home to a rich variety of flora and fauna, including the endangered Himalayan brown bear and the snow leopard.
3. **Dokriani Glacier (Uttarakhand):**
    - This glacier, located in the western Garhwal Himalayas, feeds into the Bhagirathi River and is an important source of freshwater.
    - **Nanda Devi Biosphere Reserve:** The glacier is located near the Nanda Devi Biosphere Reserve, which is a UNESCO World Heritage Site known for its unique biodiversity, including rare species like the Himalayan tahr and musk deer.
4. **Pindari Glacier (Uttarakhand):**
    - The Pindari Glacier, located in the Kumaon Himalayas, is one of the most popular trekking destinations in India. It feeds the Pindari River, a tributary of the Alaknanda.
    - **Nanda Devi National Park:** This area, near the Pindari Glacier, is home to the Nanda Devi Peak and is part of a protected biosphere.
5. **Zemu Glacier (Sikkim):**
    - The Zemu Glacier in Sikkim is an important source of water for the Teesta River.
    - **Khangchendzonga National Park:** This national park, which is a UNESCO World Heritage Site, is in the region of the Zemu Glacier and is home to a diverse range of species, including the rare red panda.

Conclusion:

The retreat of glaciers in the eastern Himalayas, particularly in Arunachal Pradesh, is a clear indicator of the accelerating impact of climate change. This poses serious concerns for water security, agriculture, and ecosystems in the region. The major glaciers in India, such as Siachen, Gangotri, and Pindari, highlight the ecological and hydrological significance of glaciers and the need for urgent measures to mitigate climate change and protect these critical water sources.

The Global Risks Report 2025

Why in News? The **Global Risks Report 2025**, released by the World Economic Forum, identifies and analyzes the most pressing global risks for the short term (1-2 years) and long term (10 years), offering insights into the interconnected challenges facing the world.

- The report is based on the **Global Risks Perception Survey (GRPS**) and emphasizes the need for global collaboration to address these issues effectively.

Categorization of Risks:

- The report categorizes risks into short-term and long-term based on their projected impacts and likelihoods:

Short-Term Risks (1-2 Years):

- **Misinformation and Disinformation:** Rapidly spreading false narratives threaten social cohesion and democracy.
- **Extreme Weather Events:** Increasingly frequent and severe events such as hurricanes, floods, and heatwaves impact human lives and infrastructure.
- **State-Based Armed Conflicts:** Heightened geopolitical tensions and conflicts challenge global stability.

Long-Term Risks (10 Years):

- **Extreme Weather Events:** Persistent and escalating events due to climate change.
- **Biodiversity Loss and Ecosystem Collapse:** Irreversible damage to ecosystems threatens food security, livelihoods, and global biodiversity.
- **Critical Earth System Changes:** Large-scale disruptions in earth systems, including oceans, forests, and the cryosphere, have far-reaching consequences for humanity.

Four Key Spheres of Risk:

The report highlights **four critical spheres shaping global risks** that are expected to intensify:

Technological Risks:

- Cybersecurity threats, data breaches, and misuse of emerging technologies such as artificial intelligence and quantum computing.
- Concerns about digital inequality and technology monopolies.

Geostrategic Risks:

- Heightened tensions between major powers.
- Rising instances of economic protectionism and weaponization of resources.

Climatic Risks:

- Increasing greenhouse gas emissions leading to climate instability.
- Focus on short-lived climate pollutants like **black carbon**, **methane**, and **hydrofluorocarbons** to mitigate climate change impacts.

Demographic Risks:

- Aging populations in developed nations and a youth bulge in developing countries.
- Challenges in managing migration and labor force participation.

Focus on Climate Action:

The report underscores the urgent need for collective climate action:

- **Short-Lived Climate Pollutants (SLCPs):** Addressing pollutants such as **black carbon**, **methane**, and **hydrofluorocarbons** can yield quick benefits for climate and public health.
- **Transition to Renewable Energy:** Accelerating investment in renewable energy to reduce dependency on fossil fuels.
- **Nature-Based Solutions:** Restoring ecosystems to build resilience against climate-related risks.

Impacts of Biodiversity and Ecosystem Collapse:

- **Food Security:** Loss of biodiversity threatens agricultural productivity and resilience.
- **Economic Costs:** Ecosystem degradation leads to reduced natural capital and affects industries reliant on natural resources.
- **Health Impacts:** Biodiversity loss increases the risk of zoonotic diseases.

Technological Innovation and Risks:

- **Emerging Technologies:** Rapid innovation in AI, biotechnology, and quantum computing raises ethical and governance concerns.
- **Cybersecurity Threats:** The proliferation of cyberattacks and ransomware disrupts economies and critical infrastructure.
- **Digital Divide:** Unequal access to technology exacerbates global inequalities.

Geopolitical Fragmentation:

- **Economic Protectionism:** Trade barriers and economic sanctions lead to global supply chain disruptions.
- **Resource Weaponization:** Control of critical resources like rare earth elements and energy is increasingly used as leverage in international relations.
- **Global Governance Challenges:** Fragmented governance undermines collaborative efforts to address transnational risks.

Recommendations for Risk Mitigation:

- **Global Cooperation:** Strengthening multilateral frameworks to address shared challenges.
- **Investing in Resilience:** Building infrastructure and systems resilient to climate and technological shocks.
- **Public-Private Partnerships:** Mobilizing resources and expertise from both public and private sectors.
- **Data-Driven Decision Making:** Using data analytics to predict and mitigate risks effectively.

Conclusion:

The **Global Risks Report 2025** highlights the complex interplay of technological, geostrategic, climatic, and demographic factors shaping the future. The report emphasizes the importance of proactive measures and collaborative efforts to mitigate these risks, ensuring a sustainable and resilient global future.

The Diamond Imprest Authorization (DIA) Scheme

Why in News? Department of Commerce, Government of India has introduced the **Diamond Imprest Authorization (DIA) Scheme** recently, aiming to enhance the global competitiveness of India's diamond sector. This scheme provides a streamlined mechanism for duty free import of **Natural Cut and Polished Diamonds**, and there by promoting value addition and boosting exports. The Scheme will be implemented with effect from 01.04.2025.

Key Features of the Scheme:

- This scheme allows the duty-free import of **Natural Cut and Polished Diamonds, of less than ¼ Carat (25 Cents).**
- **This scheme mandates export obligation** with a value addition of 10%.
- All Diamond exporters holding Two Star Export House status and above and having US $15 Million exports per year, are eligible for availing the benefit under this scheme.
- The scheme is made in response to Beneficiation policies undertaken in a number of natural diamond mining countries like **Botswana, Namibia Angola** etc where Diamond

manufactures are obliged to open cut and polishing facilities for a minimum percentage of value addition. This scheme is aimed towards retaining India's position as a global leader in the entire value **chain of Diamond industry.**

Level Playing Field for MSME Exporters:

- Supports small and medium Indian diamond exporters to compete with larger players globally.

Investment Retention:

- Aims to prevent the shift of Indian investments to diamond-mining nations.

Employment Generation:

- Creates jobs for **diamond assorters** and workers in semi-finished diamond processing units.
- Focuses on skilled craftsmen to strengthen the domestic diamond industry.

Boost to Exports:

- Expected to increase the export of **Cut and Polished Diamonds** from India.

Support for Domestic Industry:

- Protects the domestic diamond processing sector and sustains related employment.

Compliance and Ease of Business:

- Reinforces India's position in the global diamond trade by ensuring adherence to international standards while simplifying operations.

Addressing Industry Challenges:

- Designed to combat declining exports and job losses, rejuvenating the diamond industry.

About Natural Cut and Polished Diamonds:

- Natural cut and polished diamonds are diamonds that have undergone cutting and polishing after being extracted from mines as rough diamonds. The process involves:

Cutting: Shaping the diamond to enhance its brilliance and maximize its value.

Polishing: Smoothing the diamond's facets for better reflection and shine.

- These diamonds are in high demand for jewelry and industrial purposes. India, particularly Surat in Gujarat, is a global hub for diamond cutting and polishing, handling over 90% of the world's supply.

Top 3 States in India for Diamond Processing

India is not a major producer of natural diamonds, but it leads globally in diamond cutting and polishing. The states dominating this industry are:

Gujarat:

- Surat is known as the "**Diamond City of India**."
- It processes a majority of the world's diamonds.

Maharashtra:

- Mumbai serves as a trading hub for diamonds.
- Houses major diamond trading centers like the Bharat Diamond Bourse.

Rajasthan:

- Jaipur is known for its expertise in colored gemstones and diamond cutting.
- While diamond mining is limited in India, states like Madhya Pradesh (Panna region) have natural diamond reserves.

Global Export of Diamonds by India:

- India is the largest exporter of cut and polished diamonds.
- Key facts include:
- **Export Value**: India exports cut and polished diamonds worth billions of dollars annually, making it a major contributor to the country's foreign exchange.

Major Markets:

USA: The largest buyer of Indian diamonds.

Hong Kong: A significant market for Indian diamonds.

UAE (Dubai): A critical trading partner for diamond exports.

Global Diamond Industry Leaders:

Top Producing Countries for Rough Diamonds:

Russia: Largest producer of rough diamonds (Alrosa).

Botswana: Significant diamond mining through De Beers.

Canada: Known for its high-quality rough diamonds.

India's Contribution:

- India dominates the global diamond cutting and polishing market but imports most rough diamonds from mining countries like **Russia, Botswana, and Canada.**

NITI Aayog's Fiscal Health Index (FHI) Report 2025

Why in News? NITI Aayog has published its first Fiscal Health Index (FHI) report.

Purpose: Assess the fiscal health of 18 major Indian States based on their contribution to GDP, demography, public expenditure, revenues, and fiscal stability.

- **Time Period Covered:** Rankings based on performance for FY 2022-23 and trends from 2014-15 to 2021-22.
- **Released By:** NITI Aayog, chaired by Arvind Panagariya (16th Finance Commission Chairman).

Top Performers:

- **Top State: Odisha** with the highest index score of **67.8**.
- **Other Achievers:** Chhattisgarh, Goa, Jharkhand (classified as "Achievers").
- **Characteristics:**
- **Capital outlay:** Up to 4% of GSDP.
- **Non-tax revenue mobilisation:** Effective.
- **Revenue surplus:** Consistently maintained.
- **Low interest payments:** Up to 7% of revenue receipts.

Front-Runners:

- **States:** Maharashtra, Uttar Pradesh, Telangana, Madhya Pradesh, Karnataka.

Characteristics:

- **Developmental expenditure:** High, up to 73%.
- **Own tax revenue:** Witnessed consistent growth.
- **Debt sustainability:** Improved, with a **debt-to-GSDP ratio** of 24%.
- **Fiscal management:** Balanced.

Worst Performers (Aspirational States):

- **States:** Punjab, Andhra Pradesh, West Bengal, Kerala.
- **Challenges:**
  - **Fiscal deficit targets:** Not being met.
  - **Revenue mobilisation:** Low.
  - **Debt burden:** Growing.
  - **Debt sustainability:** A major concern.

Detailed Analysis of Odisha:

- **Debt Index Score:** 99.0 (highest).
- **Debt Sustainability Score:** 64.0.
- **Strengths:**
  - Maintains low fiscal deficits.
  - Good debt profile.
  - High **capital outlay-to-GSDP ratio**.

Key Challenges for Poor Performers:

- **Kerala and Punjab:** Low quality of expenditure and poor debt sustainability.
- **West Bengal:** Struggles with revenue mobilisation and debt index issues.
- **Andhra Pradesh:** High fiscal deficit.
- **Haryana:** Poor debt profile.

Historical Performance (2014-15 to 2021-22):

- Top Average FHI Scores: Odisha, Goa, Karnataka, Maharashtra, and Chhattisgarh.
- Data Source: Comptroller and Auditor General (CAG) reports.

Implications and Goals:

- **Objective:** Foster fiscal stability, improve expenditure quality, enhance revenue mobilisation, and ensure sustainable debt levels across Indian States.
- **Policy Recommendations:** Tailored fiscal reforms for underperforming States, focus on sustainable debt management, and revenue enhancements.

'Election Integrity Index'

Why in News? The Chief Election Commissioner (CEC) has recently **Advocated for 'Election Integrity Index'.**

Context:

- Chief Election Commissioner (CEC) Rajiv Kumar emphasized the need for election management bodies (EMBs) to develop an **Election Integrity Index**.
- Addressed concerns during the conclusion of a two-day international conference of EMBs hosted by the Election Commission of India (ECI) in New Delhi.

Concerns over Existing Democracy Indices:

Opaqueness in Parameters:

- Existing democracy indices lack transparency.
- Often rely on subjective interpretations rather than hard electoral facts.

Examples:

- Indices like **The Economist's Democracy Index** and **V-Dem Institute's Democracy Report** have flagged declines in India's position.

Media and Social Media Bias:

- Rankings sometimes depend on **media reports** and **social media conversations**, ignoring ground realities.
- Such indices can discredit elections, especially when released during live election periods.

Proposed Election Integrity Index:

Parameters for Transparency:

Must focus on hard facts such as:

- Free voter registration.
- Unrestricted voter participation.
- Quality and integrity of electoral processes.

Purpose:

- To complement existing democracy indices or act as a sub-index.
- Ensure **pre-qualified weightage** for transparency and fairness in rankings.

Challenges Faced by EMBs:

External Threats:

- **Cyber interference** and **disinformation** are significant issues.
- Social media platforms, while democratizing information, often spread fake news.

Efforts by ECI:

- Focused on countering fake content during the **2024 Lok Sabha elections**.
- Advocated for **"anti-pollution measures"** for social media, including algorithm-based detection of misinformation.

Call for Objectivity in Democracy Indices:

Past comments by CEC:

- **2022 Mexico Conference:** Suggested including the **local context** of countries in indices.
- **South Africa A-WEB Meeting:** Highlighted the need to **revisit assessment parameters** used by international organizations.

DeepSeek-V3 and DeepSeek-R1

Why in News? The stock market experienced a significant dip, with the tech-heavy Nasdaq dropping 3%, its worst performance in two years. This drop was attributed to the rise of the Chinese AI startup, DeepSeek, which recently unveiled its AI models — DeepSeek-V3 and DeepSeek-R1. These models quickly gained global attention, surpassing ChatGPT as the most downloaded app on the App Store, challenging OpenAI's frontier models.

What is DeepSeek?

- DeepSeek is a Chinese AI company based in Hangzhou, founded by Liang Wenfeng, also the CEO of the quantitative hedge fund High Flyer.
- The company started working on AI in 2019, and its controlling shareholder, Wenfeng, also owns patents related to chip clusters used for training AI models.
- What sets DeepSeek apart is its open-sourced AI models, which allow anyone to build upon them, with the DeepSeek-V3 trained on just $5 million, far less than the hundreds of millions invested by other companies.

Unique Features of DeepSeek AI Models:

- DeepSeek has been pitted against US AI giant OpenAI due to its optimal use of resources. DeepSeek-V3, the first model launched, surpassed GPT-4o and Claude 3.5 Sonnet in multiple benchmarks.
- It uses Mixture-of-Experts (MOE) architecture, where specialized models work together rather than a single large model. Trained on 14.8 trillion tokens, DeepSeek-V3 uses a new technique, **Multi-Head Latent Attention (MLA**), to enhance efficiency and reduce training and deployment costs.
- **DeepSeek's new model, DeepSeek-R1**, boasts the ability to "think" during tasks, allowing users to see the **model's thought process.**
- R1 matches or surpasses OpenAI's frontier model in areas like math, coding, and general knowledge, while being **90-95% more affordable than OpenAI-o1**. The open-source nature of R1 raises questions about the necessity of massive expenditures by other companies.

How DeepSeek Models are Cheaper than US Peers

- Training AI models is expensive, but DeepSeek significantly reduced costs by using NVIDIA H800 GPUs, a less advanced chip compared to the **NVIDIA H100 used by US**

AI giants. Due to US restrictions on exporting advanced chips to China, DeepSeek utilized the NVIDIA H800, which had lower chip-to-chip bandwidth.

- The company optimized its code to overcome chip limitations and trained only necessary parts of its models using a technique called **Auxiliary-Loss-Free Load** Balancing, ensuring performance was not compromised despite limited resources.

What is Auxiliary-Loss-Free Load Balancing?

In systems like MoE, multiple "experts" (sub-models) are trained simultaneously. A common problem is that certain experts might be overused while others remain underutilized. Traditional methods introduce **auxiliary loss functions** to force the model to use all experts equally, but these losses can interfere with the main task.

ALFLB avoids auxiliary losses by relying on smart routing and optimization techniques to:

1. Distribute tasks evenly across all experts.
2. Ensure that each expert contributes meaningfully to the training process.
3. Minimize computational waste without relying on artificial loss terms that may distort the main learning objective.

What is ELS Cotton ? What is Extra-long Staple Cotton?

Why in News? Union Finance Minister Nirmala Sitharaman, while presenting the Union Budget, announced a five-year mission to "facilitate significant improvements in productivity and sustainability of cotton farming, and promote **extra-long staple (ELS) cotton varieties**."

What is Extra-long Staple Cotton?

- Cotton is categorized based on fibre length into short, medium, and long staple. In India, **Gossypium hirsutum**, constituting about 96% of cotton production, falls under the medium staple category, with fibre lengths ranging between **25 to 28.6 mm**.
- ELS cotton, however, is defined by fibre lengths of **30 mm and above**. It is predominantly derived from **Gossypium barbadense**, commonly known as **Egyptian or Pima cotton**. This species originated in South America and is currently grown in countries such as **China, Egypt, Australia, and Peru**.

- In India, small pockets of ELS cotton are cultivated in **rain-fed areas of Atpadi taluka in Maharashtra's Sangli district**, and regions around **Coimbatore in Tamil Nadu**. Fabrics made from ELS cotton are renowned for their **premium quality**, making it a choice material for high-end brands.

Why is ELS Cotton Not Grown in India?

Low Yield:

- ELS cotton yields **7-8 quintals per acre**, significantly lower than the **10-12 quintals per acre** for medium staple cotton. This discourages farmers from adopting it.

Market Challenges:

- Farmers often struggle to sell ELS cotton at premium prices due to **lack of market linkages** and inefficiencies in price realization.

MSP Comparison:

- The **Minimum Support Price (MSP)** for medium staple cotton for the 2024-25 season was Rs 7,121 per quintal, while that for long staple cotton was Rs 7,521. This marginal difference does not incentivize farmers to switch to the premium ELS variety.

Pest and Weed Issues:

- ELS cotton is vulnerable to **pests** and weeds, increasing the cost and complexity of cultivation.

How Can the Cotton Mission Help?

Scientific and Technological Support:

- The Union Budget proposes **best-in-class science and technology** to boost cotton farming. This includes improving seeds, offering agronomic advice, and promoting pest-resistant and high-yield varieties.

Focus on Genetic Modification (GM) Crops:

- Farmers, especially in Maharashtra, have demanded legalization of **herbicide-tolerant Bt (HtBT) cotton** to manage weeds efficiently. While currently illegal, such technologies could enhance productivity.

Learning from Global Practices:

- India's per acre cotton yield is significantly lower than countries like **Brazil (20 quintals per acre)** and **China (15 quintals per acre)**. Adopting **better seeds** and technology can help bridge this gap, enabling India to grow ELS cotton more competitively.

Improved Market Access:

- The mission could establish **market linkages**, ensuring farmers receive premium prices for their premium produce, thus encouraging the cultivation of ELS cotton.

Conclusion:

India's Cotton Mission aims to address challenges like **low yield**, **pest attacks**, and **market barriers**, which have hindered the growth of ELS cotton. By providing **technological support**, promoting **modern farming practices**, and improving **market access**, the mission could enable India to produce this premium variety at scale, aligning with global standards.

Guru-Shishya Parampara Scheme

Why in News? The Guru-Shishya Parampara Scheme was started by the Ministry of Culture as a sub-scheme of the Kala Sanskriti Vikas Yojana (KSVY).

About the Guru-Shishya Parampara Scheme:

The **Guru-Shishya Parampara Scheme** (Repertory Grant) is a **Central Sector Scheme** implemented by the **Ministry of Culture** to promote and preserve India's traditional performing arts.

Objective:

The scheme aims to provide **financial assistance** to cultural organizations involved in:

- Performing arts such as music, dance, and theatre.
- Imparting training to **shishyas (students)** by their respective **gurus** in alignment with the ancient **Guru-Shishya Parampara**.

Eligibility and Application Process:

- **Eligible Organizations:** Must be engaged in performing arts activities, including traditional art styles.
- **Application Submission:**
    - Applications/proposals are submitted annually for both **renewal** and **fresh selection**.
    - Proposals are reviewed by an **Expert Committee** that evaluates based on scheme guidelines, cultural resources, and interaction with the Guru or organization representative.

Quantum of Assistance:

- **Guru/Director Assistance:** Rs15,000/month.
- **Shishya/Artist Assistance:**

Category	Age Group	Honorarium (□/month)
Adult Shishya/Artist	18+ years	10,000
'A' Category Child	12–<18 years	7,500
'B' Category Child	6–<12 years	3,500
'C' Category Child	3–<6 years	2,000

Achievements and Encouragement:

- Supports up to **1 Guru** and:

10 Shishyas in music and dance.

18 Shishyas in theatre.

- Encourages budding artists through fresh applications every year.

State-Wise Details (2021-2024)

Some highlights from the scheme's financial support for **Gurus and Shishyas** in recent years:

State	2021-22 (Guru/Shishya)	2022-23 (Guru/Shishya)	2023-24 (Guru/Shishya)
Uttar Pradesh	66 / 419	82 / 436	95 / 448
Haryana	15 / 90	18 / 93	20 / 97
West Bengal	231 / 1781	348 / 1991	331 / 1730
Delhi	95 / 830	105 / 791	125 / 798
Karnataka	133 / 801	152 / 822	214 / 954

Impact:

The Guru-Shishya Parampara (Repertory Grant) fosters the preservation of Indian performing arts by:

- Providing financial stability to **gurus and shishyas**.
- Encouraging traditional art forms and nurturing young talent in music, dance, and theatre.

Darien Gap

Why in News ? It was recently in news .

About the Darien Gap:

It is a remote, dense, and dangerous region that serves as a natural barrier between **Central and South America**. Spanning approximately **160 kilometers (100 miles)**, it is located between **Panama** in Central America and **Colombia** in South America. The region is characterized by swamps, rainforests, and mountainous terrain.

Key Features of the Darien Gap:

Geography:

- The Darien Gap covers parts of **eastern Panama** and **northern Colombia**.
- It includes impenetrable rainforests, rivers, and swamps, making it one of the most challenging terrains in the world.

Biodiversity:

- The region is rich in wildlife, hosting a variety of plants, birds, reptiles, and mammals.
- It forms part of the **Darien National Park**, a UNESCO World Heritage Site in Panama, and the **Los Katíos National Park** in Colombia.

Cultural Significance:

- Home to indigenous communities such as the **Emberá** and **Wounaan**, who have lived in harmony with the environment for centuries.

Significance of the Darien Gap:

The Pan-American Highway Disruption:

- The Darien Gap is the only missing link in the **Pan-American Highway**, a road system connecting North America to South America.
- Attempts to build a road through the Gap have failed due to environmental, logistical, and political challenges.

Migration Route:

- In recent years, the Darien Gap has become a perilous route for migrants traveling from South America to North America.

  Migrants face risks such as:

  - **Harsh environmental conditions**
  - **Violent criminal groups**
  - **Wild animals and diseases**

Environmental Importance:

- The region acts as a crucial ecological corridor and carbon sink, helping to combat climate change.

Challenges Associated with the Darien Gap:

Inaccessibility:

- The lack of roads and infrastructure makes navigation extremely difficult.
- The terrain is treacherous, with rivers, swamps, and thick jungle.

Criminal Activities:

- The area is a hub for **drug trafficking**, **human smuggling**, and the presence of armed groups.

Humanitarian Concerns:

- Migrants often lack food, water, and medical aid.
- Many fall victim to exploitation, robbery, and violence.

Environmental Threats:

- Increasing migration and human activity threaten the fragile ecosystem.

Efforts and Solutions:

Environmental Protection:

- Conservation efforts focus on preserving the Darien National Park and its unique biodiversity.

- Collaboration between Panama, Colombia, and international organizations is ongoing.

Migration Management:

- International agencies like the **UNHCR** and **IOM** provide support to migrants, including shelters and medical aid.
- Efforts are being made to secure safe migration routes.

Infrastructure Proposals:

- Discussions about bridging the Pan-American Highway gap continue, but concerns about environmental damage and costs remain unresolved.

Global Comparisons:

- The Darien Gap is often compared to other natural barriers like the **Himalayas** or **Sahara Desert**, but it is unique due to its role as a migration route and its impenetrable nature.

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Facts for Prelims

US Agency for International Development

Why in the news?

- US President Donald Trump has imposed a 90-day ban on foreign aid to the US Agency for International Development (USAID), which will affect its programs around the world.
- In addition, the US has announced that it will not participate in the G20 Foreign Ministers meeting to be held in Johannesburg, South Africa in the year 2025.

What is US Agency for International Development?

- **Introduction:** USAID is the primary US agency for global humanitarian and development assistance.
- **Support:** In the year 2024, USAID was allocated US$44.2 billion, which is only 0.4% of the total US federal budget but accounts for 42% of all humanitarian assistance tracked by the United Nations.
- USAID funds healthcare, food aid and disaster relief around the world.
- Top recipients under this include Ukraine, Ethiopia, Jordan, Somalia and Afghanistan.
- **USAID and India:** India's collaboration with USAID began in 1951 with the India Emergency Food Assistance Act and evolved over the decades from food aid to infrastructure, capacity building and economic reforms.
- The agency is supporting education, immunization, polio eradication and HIV (human immunodeficiency virus)/tuberculosis (TB) prevention.
- India is said to have received about US$1.5 billion from USAID in the last decade (which is about 0.2% to 0.4% of USAID's total global funding).

What are its implications for India?

- **India's role in the Global South:** India has established itself as a bridge between the Global North and the Global South and is benefiting from its rising position in the G20.
- **China and Russia:** If the US reduces its role in the G20, China and Russia could increase their influence, potentially weakening India's position amid China's growing power, potentially changing global economic dynamics.

- **Healthcare:** Although direct financial assistance to India has decreased, USAID's contribution will exceed US$50 million in 2024.
- Permanent funding cuts could impact India's vaccination program, infectious disease control and medical infrastructure.
- India may need to redirect domestic funds in order to maintain health, environment and governance projects.

Eurasian Otter in Kashmir Valley

- The Eurasian Otter has been sighted in Gurez Valley (Kashmir) for the first time in 25 years with live documentation.
- It was seen feeding on fish in the Kishanganga River (originating from Krishansar Lake, Ganderbal District (Jammu & Kashmir)).
- The river flows northwards through the Tulail and Gurez valleys of Kashmir before entering PoK.

About Eurasian Otter:

- **Introduction:** Otters are members of the mammalian family Mustelidae and live in both brackish and freshwater.
- In Jammu & Kashmir, they are locally known as Vodur and help maintain the health of the aquatic ecosystem.
- Otters are mainly active during morning and evening hours (crepuscular).
- **Habitat:** Found in the Himalayas, Northeast India and Western Ghats.
- **Carnivorous Diet:** Eats fish, crustaceans, amphibians and occasionally reptiles, birds, eggs, insects and worms.
- **Conservation Status:** Near Threatened (IUCN), Schedule I (Wildlife Protection Act, 1972), Appendix I (CITES).
- **Other Otter Species in India:** Smooth-coated Otter (throughout India), and Small-claved Otter (in the Himalayas and southern India).

What is Security Transaction Tax (STT)

Why in news? The Security transaction tax (STT) has recently jumped to **75 %** despite market volatility .

What is Security Transaction Tax (STT)?

Security Transaction Tax (STT) is a tax levied on the transaction of securities that are traded on Indian stock exchanges. It was introduced by the Indian government in the **Finance Act of 2004**, and the tax is aimed at providing an additional revenue stream to the government and simplifying the taxation of securities trading.

Association of World Election Bodies (A-WEB)

The Association of World Election Bodies (A-WEB) is the largest international platform of Election Management Bodies (EMBs), established to foster cooperation, strengthen electoral processes, and promote democracy worldwide.

Founded: October 14, 2013.

Headquarters: Incheon, **South Korea**.

Members: Over 100 EMBs from various countries.

Objective:

- Enhance collaboration among EMBs.
- Share best practices, knowledge, and expertise related to electoral management.
- Promote free, fair, transparent, and credible elections.

India & A-WEB:

- A founding member of A-WEB.
- Hosted A-WEB's General Assembly meeting in Bengaluru, India, in 2019.

Fiscal Responsibility Legislation (FRL)

Why in news ? the terms was recently used in an article that discusses about fiscal condition of Delhi Government & challenges.

What is Fiscal Responsibility Legislation (FRL)?

- The Fiscal Responsibility Legislation (FRL) is a set of laws aimed at ensuring that government borrowing and deficits are kept within sustainable limits. It is meant to promote fiscal discipline, ensuring that the government does not borrow excessively or incur deficits beyond certain thresholds. The FRL for India at the central level mandates that the Fiscal Deficit should not exceed 3% of GDP.

Example:

- Under the FRL, a state's GFD-GSDP ratio should ideally not exceed 3% to ensure fiscal discipline. If a state's GFD exceeds 3% of its GSDP, it may need to take corrective measures, such as cutting down on expenditures or increasing revenue, to bring the deficit back in line with the FRL limits.

FRL Limit of 3%:

- The FRL limit of 3% means that the Gross Fiscal Deficit (GFD) should not exceed 3% of GSDP. This is a target set to maintain fiscal stability and prevent excessive government borrowing, which could lead to **higher inflation or debt servicing costs**.

What is Chhava Controversy?

The trailer of the Bollywood film *Chhava*, based on the life of Chhatrapati Sambhaji Maharaj, has sparked controversy in Maharashtra.

- The film, featuring actor Vicky Kaushal as Sambhaji Maharaj, includes a scene where he performs the lezim folk dance alongside actress Rashmika Mandanna, playing Maharani Yesubai.
- This portrayal has faced criticism, prompting the film's director, Laxman Utekar, to announce the deletion of the scene after meeting with Maharashtra Navnirman Sena (MNS) chief Raj Thackeray.

What is the Controversy About?

- Chhatrapati Sambhajiraje, a descendant of Sambhaji Maharaj, raised objections to the film's portrayal of the king and questioned the liberties taken by the filmmakers. Maharashtra Minister Uday Samant also expressed concern, suggesting the film be reviewed by experts before release.

Lezim Dance and Its Cultural Significance :

- The lezim dance, often performed during marriage processions and festivals like **Ganesh Chaturthi**, has become a staple in physical education in Maharashtra.
- It involves rhythmic movements and the clashing of mallets, accompanied by a dhol. The film's inclusion of this dance was seen as a cultural reference but became contentious due to its portrayal in the context of a revered historical figure.

About Chhatrapati Sambhaji Maharaj Chhatrapati Sambhaji Maharaj, son of Shivaji Maharaj, ascended the throne after a bloody succession battle in 1681. He successfully defended Maratha forts against Mughal forces but was captured in 1689 and executed by the Mughal emperor Aurangzeb.

Fiscal Austerity

Why in News ? the terms was recently used regarding the Jammu & Kashmir 's recent step towards fiscal prudence.

What is Fiscal Austerity?

Fiscal austerity refers to the economic policies adopted by governments to reduce budget deficits and debt levels, primarily by cutting public spending, increasing taxes, or a combination of both. It is often implemented during periods of economic distress, particularly when a country's debt becomes unsustainable or when it faces pressure from international creditors.

Key Features of Fiscal Austerity:

1. **Spending Cuts:** Reducing government expenditure on welfare, subsidies, or public services.
2. **Tax Increases:** Raising taxes to generate more revenue.

3. **Structural Reforms:** Modifying policies to improve fiscal discipline, such as pension reforms or reducing government workforce.
4. **Privatization:** Selling public assets to raise funds and reduce the burden on government finances.

Examples of Fiscal Austerity:

1. Greece (European Debt Crisis):
2. United Kingdom (Post-2008 Crisis):
3. India (1991 Economic Crisis):

The Gyan Bharatam Mission

Why in News ? The **Gyan Bharatam Mission**, introduced in the **Union Budget 2025-26** by Finance Minister **Nirmala Sitharaman**, is a landmark initiative aimed at safeguarding India's vast manuscript heritage. This mission is designed to preserve, document, and integrate the rich intellectual traditions of India with modern knowledge systems, reflecting the government's commitment to the country's cultural and civilizational legacy.

Key Objectives:

1. **Survey and Documentation**: To identify and document over **1 crore manuscripts** from academic institutions, museums, libraries, and private collections across India.
2. **Conservation**: To ensure the physical and digital preservation of manuscripts, protecting them from decay and making them accessible for research and education.
3. **National Digital Repository**: To create a **centralized digital repository** of Indian Knowledge Systems (IKS), enabling the seamless sharing of India's intellectual heritage.
4. **Integration with Education**: To align with the **National Education Policy (NEP) 2020**, promoting ancient disciplines such as philosophy, mathematics, yoga, and traditional sciences in modern curricula.

Significance:

- **Cultural Preservation**: This mission is a crucial step toward preserving India's unique intellectual and cultural traditions for future generations.
- **Global Recognition**: By showcasing India's ancient knowledge systems, the mission positions India as a global leader in cultural and intellectual heritage.

- **Research and Innovation**: It provides researchers and academics access to invaluable historical manuscripts, encouraging the study and application of traditional wisdom in contemporary fields.

Supporting Initiatives:

The mission complements other government programs like:

- **National Archives of India**: Actively digitizing its extensive collections.
- **Bhāratīya Jñāna Paramparā Vibhāga**: Established in 2020 to promote Indian Knowledge Systems within the education sector.

Vision for the Future:

The Gyan Bharatam Mission exemplifies the Modi government's broader vision of a **"Viksit Bharat" (Developed India)**, where ancient wisdom is seamlessly integrated with modern advancements, enriching both education and national identity.

Ocean Coordination Mechanism

Why in News? In the **Union Budget 2025-26**, Finance Minister **Nirmala Sitharaman** announced the establishment of the **Ocean Coordination Mechanism** as part of India's broader efforts to promote sustainable ocean development and strengthen maritime security.

Key Features of the Ocean Coordination Mechanism:

1. **Centralized Framework**: A unified mechanism to coordinate policies, projects, and research related to oceans and coasts across ministries and states.
2. **Blue Economy Promotion**: Emphasis on leveraging ocean resources sustainably to boost India's economic growth.
3. **Scientific Research**: Support for oceanographic research, climate change impact studies, and marine biodiversity conservation.
4. **Disaster Management**: Strengthened early-warning systems and resilience for coastal and ocean-related disasters such as cyclones and tsunamis.
5. **Global Maritime Collaboration**: Enhanced participation in international efforts like the **United Nations Decade of Ocean Science for Sustainable Development (2021–2030)**.

Significance:

- **Sustainable Development**: Aligns with SDG 14 (Life Below Water), focusing on the sustainable use of oceanic resources.
- **Economic Growth**: Promotes the **blue economy**, encompassing fisheries, tourism, shipping, and renewable energy.
- **Climate Resilience**: Improves India's preparedness for the effects of climate change on oceans and coastal regions.
- **Strategic Importance**: Strengthens India's maritime security and supports the country's geopolitical influence in the **Indo-Pacific region**.

Supporting Initiatives:

- **Deep Ocean Mission (DOM)**: Focuses on underwater exploration and sustainable resource extraction.
- **Sagar Mala Project**: Enhances port infrastructure and coastal economic zones.
- **Marine Spatial Planning (MSP)**: Advocates for sustainable marine resource management.

Vision for the Future:

The Ocean Coordination Mechanism aims to position India as a global leader in maritime governance, sustainable ocean management, and blue economy development, ensuring the long-term health of marine ecosystems and the prosperity of coastal communities.

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