

1. **Mission SCOT:** The Indian Prime Minister praised the Indian space startup **Digantara** for the success of **Mission SCOT** (Space Camera for Object Tracking).
 - **About:** It is capable of detecting objects as small as 5 cm, addressing space debris and congestion issues.
 - The mission aims to improve **space traffic management** and ensure **safe and sustainable use of space** through advanced surveillance technologies.
 - **Startup's Focus:** Digantara specializes in **space situational awareness (SSA)**, enhancing orbital debris tracking and satellite collision avoidance.
 - **Innovation Impact:** Marks a major step towards **India's leadership** in space technology innovation and private sector contribution to the **space ecosystem**.
 - Supports global efforts to monitor and mitigate **space debris**, fostering the growth of **space sustainability** initiatives.
 - **About:** Space debris consists of inactive satellites, rocket stages, discarded hardware, fragments from explosions or collisions, and shed materials like insulation and paint from satellites.
2. **Firefly Constellation:** Pixxel, a Bengaluru-based space technology company backed by Google and building the world's highest-resolution hyperspectral satellite constellation, has successfully launched the first three satellites of its Firefly constellation.
 - **About:** Satellites launched via SpaceX's **Transporter-12 rideshare mission** from Vandenberg Space Force Base, California.
 - Three additional Firefly satellites to be launched in Q2 2025.
 - **Significance of Firefly Constellation:** World's **highest-resolution hyperspectral satellites** with 5-metre resolution, surpassing the 30-metre standard.
 - Capable of capturing data across **150+ spectral bands**, detecting chemical compositions, vegetation health, water quality, and atmospheric conditions.
 - Features a **40-kilometre swathe width** and daily revisit capability for consistent global coverage.
 - **Impact of Hyperspectral Imaging:** Applications in agriculture, climate action, resource management, deforestation monitoring, ocean pollution detection, and defence.

- 3. Karnali Hydro-electric Project:** Indian Renewable Energy Development Agency Ltd. (IREDA) has recently finalized a Joint Venture Agreement with SJVN Ltd., GMR Energy Ltd, and Nepal Electricity Authority (NEA).
- **About:** Development of the **900 MW Upper Karnali Hydro-electric Project** in Nepal.
 - **Purpose:** Strengthen regional energy security and accelerate renewable energy growth.
 - **Project Framework:** Development, construction, operation, and maintenance under **Build-Own-Operate-Transfer (BOOT)** model.
 - **25-year project term** from the Commercial Operation Date (CoD).
 - **About:** The Build-Own-Operate-Transfer (BOOT) is a project delivery method where a private entity builds, owns, and operates a facility for a set period of time. The private entity then transfers the facility back to the public sector when the contract ends.
- 4. Carbon Capture, Utilization, and Storage (CCUS):** NITI Aayog recently organized a pivotal workshop titled "Carbon Capture, Utilization, and Storage (CCUS) in the Indian Cement Sector" at Vigyan Bhawan.
- **About:** CCUS is a set of technologies that capture carbon dioxide (CO₂) emissions and store or reuse them. It is a key technology for reducing emissions and meeting climate goals.
 - **Objective:** Discuss sector-specific decarbonization approaches and explore CCUS technologies.
 - **CCUS in Cement Sector: 35% to 45% of emissions** require CCUS as a key abatement lever.
 - Commercializing technologies like kiln electrification and solar fuel will help but are insufficient alone.
 - **Potential for CCUS in India:** Regions like **Krishna-Godavari Basin, Deccan Traps, and mature oil and gas fields** offer significant CO₂ storage capacity.
 - **Cement Sector** accounts for **5.8% of India's CO₂ emissions**.
 - Innovative CO₂ utilization pathways, such as producing **methanol, biodegradable plastics, and value-added chemicals**, will drive a sustainable future.
 - **Role of DST:** The **Department of Science and Technology (DST)** is developing CCUS technologies.
 - DST set up the **Centre of Excellence on "Carbon Capture, Utilisation, and Sequestration" (DST-CoE-CCUS-CDI)**.

5. Permafrost: A study identified **20 regions in the Arctic** most vulnerable to climate change, with **permafrost** being a common factor in all hotspots.

- **About:** Permafrost refers to soil or rock that has remained at or below **0°C** for at least **two consecutive years**.
 - Climate change causes permafrost to thaw, which could release **carbon emissions** that have been locked in ice for thousands of years.
- **Regions Affected:** **16 hotspots** are in **Eurasia**, and the remaining are in **North America**.
 - These regions are vulnerable due to the thawing of permafrost, which is highly susceptible to temperature rise.
- **Key Findings:** **Eastern Siberian tundra** and **central Siberia** saw substantial land warming between **1997-2020**.
 - The **Eurasian tundra** was more impacted than **boreal forests**.
 - **99%** of Eurasian tundra experienced significant warming.
 - **72%** of Eurasian boreal forests experienced warming.
- **Warming Causes:** Loss of **sea ice** in the Arctic Ocean, exposing dark sea that absorbs sunlight, contributing to further warming.



6. Gangasagar Mela: Climate change has registered a significant imprint on the Sagar Island in West Bengal, where the Hindu festival, Gangasagar Mela, is held every year on Makar Sankranti.

- **About:** Sagar Island is also known as Ganga Sagar or Sagardwip, located in the Ganges Delta on the continental shelf of the Bay of Bengal.
- **Geographical Features:** Separated from Mahisani Island by the Muriganga River Batala.
 - Classified under the sand group category, along with **Mahisani** and **Ghoramara Islands**.
 - Part of the Sundarbans, but lacks: Tiger habitation and Mangrove forests.
 - Small river tributaries typical of the Sundarban delta.
- **Religious Significance:** It is a prominent Hindu pilgrimage site and hosts the annual Gangasagar Mela, the world's second-largest human congregation, during Makar Sankranti.

7. Devaluation of Rupee: The Indian rupee recently registered a sharp devaluation with respect to the dollar after remaining stable for over two years or so.

- **About factors contributing to Rupee Devaluation:** The **Capital Outflows** leads to significant **withdrawal of foreign investments**.
 - **Higher Import Costs** escalate prices for imported goods, especially energy and raw materials.
 - Adjustments in monetary or exchange rate policies by the Reserve Bank of India.
- **Exchange Rate Dynamics:**
 - **Nominal Exchange Rate** represents the cost of acquiring one unit of foreign currency using domestic currency.
 - **Determinants of Change:** Influenced by demand and supply in the foreign exchange market.
 - **Central Bank Policies:** Shaped by the exchange rate strategy adopted by the RBI.
- **Impacts on the nation's economy:**
 - **Increased Import Costs:** A weaker rupee elevates the cost of imports, notably crude oil, leading to higher domestic fuel prices and potential inflationary pressures.
 - **Foreign Exchange Reserves Decline:** To stabilize the rupee, the Reserve Bank of India (RBI) has intervened in the forex market, resulting in a reduction of foreign exchange reserves to a 10-month low of \$625.87 billion as of January 10, 2025.
 - **Impact on Importers' Hedging Strategies:** Importers utilizing the 'seagull' option strategy for hedging have faced increased costs due to the rupee's sharp depreciation, as this strategy doesn't lock in a fixed exchange rate.
 - **Capital Outflows:** The rupee's decline has coincided with significant foreign portfolio outflows, with investors withdrawing approximately \$6 billion from Indian stocks and bonds in January 2025, exacerbating the currency's depreciation.
 - **Monetary Policy Challenges:** The rupee's depreciation complicates the RBI's monetary policy decisions, particularly concerning interest rate adjustments, due to heightened inflation concerns stemming from increased import costs.
 - **Historical Context:** India has previously faced currency devaluations, notably during the 1991 economic crisis, which led to significant economic reforms and liberalization measures.