1. **Kariyachalli Island:** Recently, the Tamil Nadu government has launched an ambitious initiative under the **Tamil Nadu Sustainably Harnessing Ocean Resources (TNSHORE) project**. This move comes in response to the existential threat faced by **Kariyachalli Island.**
   - **About Kariyachalli Island :** Also known as Kariya Shulli Tivu or Karai Challi Island.
     - **Location**: Situated in the **Gulf of Mannar**, off the coast of Tamil Nadu.
     - **Protection Status**: Comes under the **Gulf of Mannar Marine National Park**, a designated protected area.
     - **Historical Size**: In 1969, the island covered an area of 20.85 hectares.
     - **Current Size**: As of 2025, it has reduced drastically to just 3.14 hectares during high tide (as per an IIT Madras report).
     - **Rate of Erosion**: The island has been steadily shrinking due to coastal erosion and other environmental pressures.
     - **Future Projection**: Scientists warn that if the current erosion continues, the island may vanish entirely by **2036**.
   - **About Gulf of Mannar**: Comprises a chain of **21 islands**, featuring **estuaries, beaches, mudflats**, and coral reefs.
     - **Geographic Location**: Located along the **southeastern coast of India**, facing **Sri Lanka** across the Palk Strait.
   - **About Project TNSHORE:** To counter coastal erosion and biodiversity loss (begins in **Aug 2025**).
     - **Key Objectives**: Deployment of 8,500 artificial reef modules along vulnerable coastal areas.
       - ✓ Restoration of coral reefs and seagrass meadows to revive marine ecosystems.
       - ✓ Conservation of marine biodiversity, especially habitats for endangered species like dugongs.
2. **Supercapacitors :** Recently, scientists from the **Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru**, along with **Aligarh Muslim University**, have made an important discovery to improve **supercapacitors**, which are used for fast and efficient energy storage.
   - **About Supercapacitors :** Energy storage devices that can **charge and discharge very quickly**, making them ideal for high-power applications.
     - Used in EVs, renewable energy grids, portable electronics, and smart energy systems

- **Main Limitation**: Supercapacitors have **lower energy density** than traditional batteries, meaning they store less energy for the same size.
  - The recent innovation improves **energy density**, helping supercapacitors become more competitive with batteries while retaining their speed and efficiency advantages.
- **Key Innovation**: Scientists modified **silver niobate ($AgNbO_3$)**—a lead-free, eco-friendly perovskite—by doping it with **lanthanum (La)**, a rare-earth element with excellent electronic properties.
  - Particle size reduced, leading to **greater surface area**, which enhances energy storage efficiency.
  - Improved electrical conductivity, allowing **faster charge-discharge cycles** and better overall performance.
- **Results**: Achieved **118% energy retention** even after prolonged use.
  - Recorded **100% coulombic efficiency**, meaning almost **no energy loss** during charging and discharging.
  - Demonstrated practical use by **powering an LCD display** with the prototype supercapacitor.

3. **SPREE 2025** : Recently, the **Employees' State Insurance Corporation (ESIC)** launched **SPREE 2025** (Scheme for Promotion of Registration of Employers and Employees), a focused initiative aimed at bringing **unregistered establishments and workers** under the **social security net**.
   - **About SPREE 2025** : First introduced in **2016** with the objective of **expanding ESI coverage** across India. It led to the successful registration of over **88,000 employers** and **1.02 crore employees**.
     - **Renewed SPREE 2025** will be active from **1st July to 31st December 2025**, offering a **one-time window** for **unregistered employers and workers**—including **contractual and temporary staff**—to enroll under the **Employees' State Insurance (ESI) Act**.
     - **Key Features** : Employers who register during the scheme period will be considered covered from either the **date of registration** or the **date they declare**.
       - ✓ Employees will be covered from their respective **registration dates**.
       - ✓ The scheme promotes **voluntary compliance** over penal action to reduce litigation, promote formalization, and build **better engagement and trust** among stakeholders.

4. **C-FLOOD:** Recently, in a significant move to enhance India's disaster resilience, the Union Minister of **Jal Shakti** inaugurated **C-FLOOD**, a **Unified Inundation Forecasting System** designed to improve flood forecasting and management across the country.
   - **About C-FLOOD :** A **web-based portal** that provides **flood inundation forecasts up to two days in advance**, down to the **village level**.
     - It was **jointly developed** by the **Centre for Development of Advanced Computing (C-DAC), Pune**, and the **Central Water Commission (CWC)**.
     - The system aims to **revolutionize flood prediction** and strengthen early warning and disaster response mechanisms.
     - **Core Features** : **Flood Inundation Maps**: Visual representation of potential flood-affected areas.
       - ✓ **Water Level Predictions**: Timely updates for better preparedness.
       - ✓ **User-Friendly Interface**: Designed as a **decision-support tool** for disaster management authorities.
       - ✓ **Integration with National & Regional Models**: Enhances coordination and accuracy in planning and response.
   - The project is part of the **National Supercomputing Mission (NSM)**, jointly driven by the **Ministry of Electronics and Information Technology (MeitY)** and the **Department of Science and Technology (DST)**.
5. **Moon Dust:** Recently, a study published in the journal *Life Sciences in Space Research* by researchers at the **University of Technology Sydney (UTS)** revealed that **urban air pollution may pose greater health risks than moon dust**.
     - This finding challenges long-standing assumptions about the dangers associated with lunar exploration.
   - **About Moon dust** : Formed over centuries as **meteorites continuously bombard the lunar surface**, breaking down moon rocks into fine particles.
   - **Moon Dust vs. City Pollution:** Researchers compared **replica lunar dust particles**, known for their **sharp, jagged structure and electrostatic cling**, with **urban PM2.5 particles** commonly found in city air pollution.

- **Lunar dust**, though a **physical irritant**, did **not cause significant inflammation** or **cellular damage** in human lung cells.
- **Urban air pollution particles**, which are **chemically complex** and often carry **toxic compounds**, led to **greater oxidative stress** and **stronger inflammatory responses**.
- No major **oxidative stress** (a key indicator of long-term toxicity) was observed in cells exposed to **moon dust simulants**.

6. **Sinhalese and Adivasi Populations** : Recently, a groundbreaking genome study published in Current Biology has offered new insights into the **ancestral origins and genetic evolution** of the **Sinhalese and Adivasi populations** in Sri Lanka.
   - Contrary to long-standing beliefs that the **Sinhalese migrated from northern India**, the study reveals **strong genetic connections with South Indian Dravidian-speaking populations**.

- **Key Highlights :** Involved whole-genome sequencing of **35 urban Sinhalese** and **19 Adivasi individuals** (5 Interior Adivasi, 14 Coastal Adivasi).
  - Also included genome data of **35 Sri Lankan Tamils** from the 1,000 Genomes Project.
  - Both **Sinhalese and Adivasi populations are genetically closest to Dravidian-speaking South Indian groups**, not North Indians—contradicting earlier theories of a northern origin for the Sinhalese.
  - Sinhalese carry a **high proportion of Ancestral South Indian (ASI) ancestry** and **low Steppe-related Indo-European ancestry**, despite speaking an Indo-European language.
  - The **language of the Sinhalese (Indo-European)** does **not align with their genetic ancestry**—suggesting cultural transmission of language rather than migration of a large genetically distinct population.
  - Genetic and anthropological evidence confirms that **Adivasi were present in Sri Lanka before the Sinhalese migrated**, descending from early hunter-gatherers.
  - This is the **first high-resolution genome sequencing** of Indigenous Adivasi and urban Sinhalese populations, offering **new insights into South Asian population history**.
- The study highlights **deep genetic ties between India and Sri Lanka**, shaped over thousands of years of **migration and intermixing**.

7. **DengiAll** :Recently, India crossed the 50% enrolment mark in Phase III clinical trials of its indigenous dengue vaccine, '**DengiAll'**, with over 7,000 volunteers participating across 20 trial sites nationwide.
   - **About DengiAll :** Developed by Panacea Biotec, an Indian pharmaceutical company, under a **licensing agreement with the U.S. National Institutes of Health (NIH)**.
     - **Vaccine Type**: It is a **single-dose tetravalent live attenuated vaccine**, meaning it targets **all four strains of the dengue virus** and aims to induce a **balanced immune response**.
     - **Origin** : The **TV003/TV005 vaccine strain** was originally developed by the **NIH, USA**.
   - **Dengue**: Viral infection transmitted through the bite of infected Aedes species mosquitoes.
     - **Found**: Tropical & sub-tropical climates worldwide, mostly in urban and semi-urban areas.
     - **Symptoms:** Usually begin 4–10 days after infection and last for 2–7 days. Symptoms may **include**: high fever, severe headache, pain behind the eyes, nausea, vomiting, swollen glands and rash. **Severe Symptoms**: severe abdominal pain, persistent vomiting, rapid breathing, bleeding gums or nose, fatigue and restlessness.
     - **Treatment**: There is no specific treatment for dengue.
8. **India-US Trade**: Recently, U.S. President proposed a major trade deal with India to boost American agricultural exports, but India has firmly set **red lines** to protect its farmers and agri-economy.
   - **India's Red Lines : Corn: U.S. Demand**: Import of genetically modified (GM) maize.
     - ✓ **India's Position**: Permitted **only for ethanol production**, not for food or animal feed.
     - **Ethanol: U.S. Demand**: Access to India's **fuel ethanol market**.
       - ✓ **India's Position**: Imports allowed **only for non-fuel industrial use**..
     - **Soyabean: U.S. Demand**: Import of **GM soyabean beans and de-oiled cakes (DOC)**.
       - ✓ **India's Position**: **Only GM soyabean oil** is allowed; **beans and DOC are restricted**.
     - **Dairy: U.S. Demand**: Open access to **India's dairy market**.
       - ✓ **India's Position**: Maintains **high tariffs** and requires **ethical sourcing** (no bovine remains in feed).
   - India's agri-trade red lines protect against GM crops, secure energy goals, shield farmer incomes, and preserve rural and cultural integrity.