1. **Zimislecel** : Recently, a landmark clinical advancement demonstrated that a therapy using lab-grown islet cells, called **zimislecel**, has the potential to restore insulin production in individuals with severe Type 1 diabetes.
   - **About Zimislecel :** A novel therapy that involves infusing lab-grown islet cells, derived from pluripotent stem cells, into the liver via the hepatic portal vein.
     - These islet cells replace the insulin-producing beta cells destroyed by the immune system in Type 1 diabetes.
     - Once implanted, the cells begin producing insulin naturally from within the body.
     - **Clinical Trial Overview**: Phase 1/2 trial included 12 patients with severe, long-standing Type 1 diabetes. Participants had poor glucose control and a history of life-threatening hypoglycaemic episodes.
     - **Key Findings**: **Insulin production restored:** All 12 patients began producing C-peptide, a marker of insulin secretion—within 90 days.
       - ✓ **Improved blood sugar control:** HbA1c levels dropped below 7% in all participants within four months.
       - ✓ **Reduced insulin dependence:** 10 out of 12 participants were able to completely stop insulin injections.
       - ✓ **Better glucose range stability:** Time in target blood glucose range increased from 50% to over 93%.
   - **About Type 1 Diabetes** : Caused by the immune system attacking the pancreas's insulin-producing islet cells, stopping natural insulin production.
     - Patients must rely on external insulin injections and continuous glucose monitoring to manage their condition. Nearly 75% of individuals with Type 1 diabetes are unable to consistently achieve target glucose levels.
     - Poor glucose control increases the risk of long-term complications, including nerve damage, kidney disease, and cardiovascular issues.
2. **2025 Global Wetland Outlook (GWO):** Recently, the **2025 Global Wetland Outlook (GWO),** released by the **Ramsar Convention** Secretariat, has raised serious concerns over the alarming rate of wetland degradation in Africa, as among the most severely deteriorated in the world.

- **Key Highlights :** Field surveys show actual wetland conditions are often worse than national estimates suggest.
  - Across all six Ramsar regions, more countries reported wetland decline than improvement—most critically in least developed and lower-middle-income countries.
  - **Comparative Global Trends**: **North America & Oceania:** Invasive species are the main threat.
    - ✓ **Europe:** Prolonged drought is the primary concern.
- **About Ramsar Convention:** An international treaty for the **conservation and sustainable use of wetlands**, also known as the **Convention on Wetlands**.
  - **Origin:** Signed in **Ramsar, Iran**, on **2nd February 1971**.
  - **World Wetlands Day:** Celebrated every year on **2nd February** to mark the signing of the convention.
  - **Membership:** Has **172 Contracting Parties** as of 2025.
- **About Wetlands:** Areas of **marsh, peatland, or water** (static or flowing; fresh, brackish, or saline). Includes **marine water** up to **6 metres deep** at low tide.
  - Act as **ecotones**—transitional zones between land and water ecosystems.
  - **Examples of Wetlands: Mangroves**, **Lake littorals** (shoreline areas between highest and lowest water levels), **Floodplains** (adjacent low-lying river areas that flood periodically), **Marshes and swamps.**

3. IRAS 18162-2048 : Recently, in a significant astronomical breakthrough, scientists from the Indian Institute of Space Science and Technology (IIST), Thiruvananthapuram, have detected circularly polarised radio emissions near the massive young protostar **IRAS 18162-2048**.

- This marks the first direct evidence of strong magnetic fields in the immediate environment of such a protostar.

- **About IRAS 18162-2048:** A massive protostar located about **4,500 light years away** in the Milky Way. It is one of the **most studied massive protostars** due to its unique energetic features.
  - The protostar is known for powering **HH80-81**, one of the **largest and brightest bipolar jets** in the galaxy—ejecting high-speed matter in opposite directions.
  - These **Herbig-Haro (HH) jets** are crucial markers of early star formation.

- **New Discovery:** While previous studies had mapped **magnetic fields along the jet**, the latest detection marks the **first direct evidence of magnetic activity near the core** of the protostar.
  - This strongly suggests that **magnetic fields play a key role** in launching and regulating such massive outflows.
- **Scientific Impact:** The discovery provides **new insights into high-mass star formation**, a less understood process compared to low-mass star formation. It supports the theory that **magnetic fields** are essential in shaping **early stellar evolution**.
- **About Protostar** : An early stage in the process of **star formation**, preceding the main sequence phase.
  - It forms from the **collapse of a giant molecular cloud** in the interstellar medium, composed mainly of gas and dust.
  - Becomes a **main sequence star** once **hydrogen fusion** begins in its core.
  - Typically **obscured by surrounding dust**, making them difficult to detect in visible light.

4. Central Himalayan Region : Recently, for the first time, Indian scientists have obtained continuous, high-resolution ground-based measurements of major **greenhouse gases** in the **Central Himalayan region.**

- This breakthrough reveals how both natural processes and human activities are shaping emissions in this ecologically fragile and climate-sensitive zone.
- **Key Highlights:** Conducted by **ARIES (Aryabhatta Research Institute of Observational Sciences), Nainital**, under the **Department of Science and Technology (DST)**.
  - Based on five years of continuous ground measurements (2014–2018) in the Central Himalayan region.
  - **Diurnal and Seasonal Patterns**: **Carbon dioxide (CO_2)** dips during the **daytime**, due to **photosynthesis**, but rises in **spring** due to **biomass burning** and minimal vegetation.
    - ✓ **Methane (CH_4)** peaks in **autumn**, likely due to **agricultural practices** such as **rice cultivation**.
    - ✓ **Carbon monoxide (CO)** shows highest levels in **late spring**, driven by **regional pollution transported** from the plains.

- **Comparative Trends with Mauna Loa (Hawaii)**: **CO_2:** Rising at **2.66 ppm/year** in the Himalayas (higher than global average).
  - **CH_4:** Increasing at **9.53 ppb/year**, again exceeding background levels.
  - **CO:** Declining at **3.15 ppb/year**, possibly due to **improved combustion** or changing emission sources.
- **Central Himalayas :** Also known as the **Himadri**, **Inner Himalayas**, or **Greater Himalayas** .
  - Made up of **Archaean rocks** such as **granite**, **gneiss**, and **ancient schist**.
  - **Changing Orientation Across Regions: Southeast** across **northern Pakistan, northern India, and Nepal**.
    - ✓ **Eastward** through **Sikkim and Bhutan**.
    - ✓ **Northeast** across **northern Arunachal Pradesh**.
  - Prominent peaks, including **Nanga Parbat**, **Mount Everest**, **Kanchenjunga**, and **Namcha Barwa**.
  - The range features **steep slopes on its northern side** and **gentler slopes on the southern side**.

5. Pheromones : Recently, Scientists have successfully demonstrated that **manipulating pheromones in locusts** can prevent them from forming destructive swarms or engaging in group behaviors that lead to mass feeding frenzies.

- This breakthrough offers a promising strategy for controlling **locust outbreaks** by disrupting their communication signals.

- **About Pheromones:** Chemical substances **secreted outside the body** by an individual and detected by another of the **same species**.
  - They are present in all bodily secretions, especially in **axillary sweat**, and are sensed by the **olfactory system**.
  - Pheromones are classified as **ecto-hormones** because they act **outside the body**.
  - **Types of Pheromones**: **Releaser Pheromones** – Trigger an immediate and specific response.
    - ✓ **Signaler Pheromones** – Convey information about the individual (e.g., help a mother recognize her baby).
    - ✓ **Modulator Pheromones** – Influence mood and emotional states.

- ✓ **Primer Pheromones** – Affect hormonal activity, such as during pregnancy or menstrual cycles.

- **Role of Pheromones in Animals and Other Organisms:** In animals, pheromones help **raise** alarms, mark food trails, warn intruders, and bond with offspring.
  - Detected via the **vomeronasal organ**.
  - **Fungi, slime molds, and algae** use them to attract mating types during reproduction.

6. **Swachh Survekshan 2024–25 Awards :** Recently, the President of India conferred the **Swachh Survekshan 2024–25 Awards** at Vigyan Bhawan, New Delhi, in a ceremony organized by the Ministry of Housing and Urban Affairs (MoHUA).

- **Key Highlights : Top Performers: Ahmedabad**, **Bhopal**, and **Lucknow** declared the cleanest cities (population 10 lakh+).
  - **Mira Bhayandar**, **Bilaspur**, and **Jamshedpur** ranked top 3 among cities with 3–10 lakh population.
  - **Prayagraj** named **Best Ganga Town** for sanitation excellence.
  - **Super Swachh League :** New elite category for consistent top performers of past 3 years:
    - ✓ **10+ lakh population:** Indore (1st), Surat (2nd), Navi Mumbai (3rd), Vijayawada (4th).
    - ✓ **3–10 lakh population:** Noida, Chandigarh, Mysuru, Ujjain, Gandhinagar.
    - ✓ These cities excluded from national rankings to honour sustained excellence.
    - ✓ **Indore** elevated after winning the cleanest city title 8 times in a row.
  - Introduced **"One City, One Award"** principle for fairer competition.
  - **78 awards** presented across cities, cantonments, and institutions.
  - **34 cities** recognised as **Promising Swachh Shehars** for sanitation progress.
  - **Special Awards: Uttar Pradesh Govt**, **Prayagraj Mela Adhikari**, and **Municipal Corporation of Prayagraj** awarded for handling urban waste during **Mahakumbh** (66 crore footfall).
    - ✓ **Secunderabad Cantonment Board** awarded for sanitation performance.
  - **Largest Urban Sanitation Survey Globally:** From **73 cities (2016)** to **4,589 cities (2025)**.
  - Under **Swachh Bharat Mission Urban 2.0**, target: **100% remediation by 2026**.
  - New **Accelerated Dumpsite Remediation Programme** to boost waste processing capacity with govt support in finance, tendering and execution.