1. **Foreign Contribution Regulation Act (FCRA):** The Central Bureau of Investigation (CBI) recently conducted a raid at the residence of a senior Aam Aadmi Party (AAP) leader in connection with alleged violations of the Foreign Contribution Regulation Act (FCRA).
   - **About FCRA:** Introduced in 1976 during Emergency to prevent foreign influence on internal affairs to regulate and oversee flow of foreign funds into India.
   - **FCRA Amendment Act, 2020:**
     - **Transfer Ban:** No transfer of foreign funds to individuals, associations, companies.
     - **Aadhaar Mandatory:** Aadhaar/passport/OCI card required for office bearers.
     - **Designated Bank Account:** Must receive funds via SBI branch in New Delhi.
     - **Admin Expenses Cut:** Limit reduced from 50% to 20%.
     - **Renewal Checks:** Government can verify authenticity before renewing licence.
     - **Suspension Extension:** Can extend suspension beyond 180 days by another 180.
     - **Surrender Allowed:** Certificate can be surrendered with government approval.
     - **Fund Restriction:** Unutilised funds can be restricted post-inquiry.
   - **FCRA Rules 2022:** Prevents foreign funds/hospitality harming national security.
     - **Higher Limit:** Indians can receive up to ₹10 lakh/year from relatives abroad (up from ₹1 lakh) without informing govt.
2. **Exoplanet K2-18b:** Scientists, using the James Webb Space Telescope (JWST), have detected molecules linked to life in the atmosphere of exoplanet **K2-18b**, offering new clues in the search for alien life.
   - **About Exoplanet K2-18b:** It is located about 124 light years away in the Leo constellation. It is a sub-Neptune exoplanet and part of Hycean worlds – planets that are potentially habitable.
   - **Parent Star:** The planet orbits the red dwarf star K2-18. It is about 8.6 times the mass of Earth.
   - **Atmosphere Composition:** Based on a September 2023 paper, astronomers detected methane and carbon dioxide in its atmosphere using JWST.
   - **Possible Life Molecules:** Recently, JWST detected either dimethyl sulfide (DMS) or dimethyl disulfide (DMDS), gases associated with life on Earth and typically produced by **bacteria** and **marine phytoplankton**.

3. **De-extinction of Dire wolves:** Colossal Biosciences, a biotechnology company in Texas, recently announced that it had "resurrected" a dire wolf, a large predator that went extinct more than 12,000 years ago.



   - **About Dire Wolves:** The genome of a gray wolf (Canis lupus) has 2.447 billion base pairs.
     - **Similarity:** Gray wolf and dire wolf (Aenocyon dirus) genomes are 99.94% identical, i.e., 2.445 billion base pairs are the same.
     - **Difference:** The remaining 0.06% (or 1.47 million base pairs) makes the two animals genetically distinct.
     - **Comparison:** Humans and chimpanzees share 98.77% DNA, yet are very different — highlighting that small genetic differences are significant.
     - **Colossal's approach:** Scientists edited the gray wolf genome and implanted embryos into surrogate dog mothers.
     - **Genetic edits:** Edits were made at 20 loci across 14 genes to "recreate" the dire wolf.
     - Estimate: These edits likely represent only 0.02% of the total genetic differences, indicating the pups are not true dire wolves.
   - **Changes Made by Scientists:** Edited genes relate mostly to **cosmetic traits** like **fur colour, density**, and **body size**.
     - **LCORL gene**: One of the edited genes is **LCORL**, linked to **larger size** in dire wolves.
     - **Result**: Colossal Biosciences has created **gray wolves that look like dire wolves**, rather than true dire wolves.

4. **Vehicle-to-Grid (V2G) technology:** Kerala State Electricity Board (KSEB), in collaboration with IIT Bombay, recently launched a pilot project to assess the feasibility of Vehicle-to-Grid (V2G) technology integration with the State's power grid to evaluate EVs' role in grid support during peak demand when solar energy is not available.
   - **About V2G:** It allows Electric Vehicle (EV) batteries to send power back to the electricity grid.
     - **Function:** EVs act as decentralized battery storage systems via bi-directional chargers when not in use.
   - **Working of V2G: Grid-to-Vehicle (G2V)** -Power flows from the grid to charge the EV & **Vehicle-to-Grid (V2G)** - EV discharges stored energy back into the grid when required.

- **Applications:**
  - **Vehicle-to-Home (V2H):** EVs power household devices.
  - **Vehicle-to-Vehicle (V2V):** Energy transfer between EVs.
- **V2G Technology in India's Power Sector**
  - **Peak Load Reduction:** EVs discharge energy during peak periods, reducing power plant stress and energy costs.
  - **Load Balancing:** Charging EVs during off-peak hours helps stabilize daily electricity demand.
  - **Storage for Renewables:** V2G stores surplus solar/wind power and releases it during shortfalls.
  - **Grid Balancing:** Offers services like frequency regulation and voltage support.

5. **Flue Gas Desulphurisation (FGD):** Union Environment Ministry is being urged to roll back its 2015 policy mandating all of India's 537 coal-fired plants to install Flue Gas Desulphurisation (FGD) equipment to reduce sulphur dioxide (SO_2) emissions.

- **About Flue Gas Desulphurisation (FGD):** It is a technology to eliminate sulphur compounds from exhaust emissions.
  - Flue gas is the emitted material produced when fossil fuels such as coal, oil, natural gas, or wood are burned for heat or power.
  - FGD process involves the addition of absorbents, which can remove up to 95% of the sulphur dioxide from the flue gas.
  - Absorbents such as ammonia or sodium sulphite are used; however, the use of lime or limestone slurry (wet limestone scrubbing) is also widespread.
  - Uncleaned flue gas is sprayed in a scrubber tower (absorber tower) with a mixture of water and limestone (scrubbing slurry), whereby most of the sulphur dioxide is bonded by chemical reaction.
- **About Sulphur Dioxide & their Impact:** Sulphur dioxide is a major air pollutant which impacts all life. It is also a precursor of acid rain, which has significant adverse impacts on forests, freshwaters, and soils.
  - Acid rain can kill insect and aquatic life forms, cause paint to peel, corrosion of steel structures such as bridges, and weathering of stone buildings and statues.

6. **International Big Cat Alliance (IBCA):** Recently, the International Big Cat Alliance (IBCA) signed an agreement with the Central Government, officially designating India as the headquarters and secretariat of the alliance.
   - **About:** The IBCA was established by GOI **on April 9, 2023**, during the **50 years of Project Tiger** event, through the nodal organisation viz., National Tiger Conservation Authority (NTCA), Ministry of Environment, Forest & Climate Change (MoEFCC).
   - **Recent Development:** Five countries—Nicaragua, Eswatini, India, Somalia, and Liberia—have ratified/accepted/approved the agreement under Article VIII (1).
   - **Membership:** 27 countries, including India, have expressed consent to join IBCA, with several international and national wildlife conservation organizations partnering with it.
   - **Conservation Aim:** IBCA focuses on seven big cats—Tiger, Lion, Leopard, Snow Leopard, Cheetah, Jaguar, and Puma—with membership open to UN range and non-range countries interested in conservation.
   - **Objective**: IBCA aims to enhance global collaboration by consolidating successful conservation practices, financial support, and expertise to halt and reverse big cat population decline.
   - **Collaborative Approach:** It promotes synergy through→ Gold standard conservation practices and a central repository of knowledge→ Species-specific intergovernmental platforms and transnational conservation initiatives→ Securing the ecological future and mitigating climate change impacts.
7. **UGRAM:** Technology Development Board (TDB) under the Department of Science and Technology (DST) has recently extended financial support to manufacture & develop the fully indigenous UGRAM assault rifle.
   - **About UGRAM:** It is a modular, ergonomically designed 7.62 mm x 51 mm assault rifle, intended for counter-insurgency (CI) and counter-terror (CT) operations.
     - **Indigenous Development:** 100% design, material selection, manufacturing, and testing have been done domestically, approved by ARDE, DRDO.
     - Long-stroke piston mechanism is used for enhanced reliability.



- High-strength steel is used in all pressure-bearing parts. High-grade nylon-based handguard, pistol grip, and buttstock are used.
- Features include ambidextrous magazine release and side-mounted cocking handle. It has an effective range of 500 metres. It weighs less than four kilograms.
- The rifle has a 20-round magazine and fires in robust full-auto mode. The rifle is more ferocious than 5.62 mm calibre rifles like INSAS.

8. **Arsenic Concentrations in Rice:** As per the recent study published in Lancet Planetary Health links climate change to increased arsenic levels in rice.
   - **About:** CO_2 levels and temperature rise beyond 2°C increase inorganic arsenic in rice grains.
     - Soil chemistry shifts under climate change promote arsenic absorption by rice plants.
     - Health risk models considered population size, rice consumption, and flood-irrigated farmland across 7 Asian nations – Bangladesh, China, India, Indonesia, Myanmar, the Philippines, and Vietnam.
     - Rising arsenic could increase risks of cancer, heart disease, diabetes, and other arsenic-related health problems by 2050.
     - Flooded rice fields allow plants to absorb arsenic from water, worsening the impact under climate change.
   - **About:** Arsenic is a naturally occurring toxic element found in soil and water.
     - Inorganic arsenic in rice can cause cancer, cardiovascular diseases, diabetes, and other chronic health issues.
9. **Microplastics** & **Nanoplastics**: As per the recent study, microplastics and nanoplastics are absorbed by plant leaves, entering the food chain through herbivores and crops consumed by humans.
   - **About:** Microplastics are plastic particles up to 5 millimetres in diameter and nanoplastics are smaller than 1,000 nanometres.
   - Microplastics enter plant leaves via stomata (small pores) and cuticle (wax membrane). Stomata are pores that allow gases to enter the plant. Cuticle is a protective wax membrane that promotes particle absorption.
   - Microplastics move through spaces between plant cells and accumulate in trichomes (hair-like structures on leaves).