

## UPSC Daily Current Affairs| Prelimbites 26-07-2025

### NISAR (NASA-ISRO Synthetic Aperture Radar)

*Prelims - Current events of National & International importance and General Science.*

#### Why in News?

NISAR will be launched by Geosynchronous Satellite Launch Vehicle (GSLV) from the Satish Dhawan Space Centre in Sriharikota.

- **NASA-ISRO SAR (NISAR) Mission** - It is a unique Earth observation satellite, and the first satellite to observe the Earth with a dual frequency Synthetic Aperture Radar (SAR).
  - **Dual frequency SAR** — NASA's L-band and ISRO's S-band.
- It is the first joint collaboration between **NASA and ISRO**.
- **Aim** - To deliver extensive environmental and geological data to scientists worldwide.
- **Features**
  - **Launch Vehicle** - GSLV-F16 rocket.
  - **Orbit** - Sun-synchronous orbit at a distance of 743km with an inclination of 98.40 degrees.
  - **Payload capacity** - 2,392 kg.
  - **Antenna & reflector** - NASA's 12m unfurlable mesh reflector antenna, integrated to ISRO's modified I3K satellite bus.
  - **High-Resolution Imaging** - It uses Sweep SAR (Swept Synthetic Aperture Radar) technology for the first time.
  - **All-Weather, Day & Night Operation** - NISAR's radar systems can penetrate clouds and light rain, enabling continuous data collection regardless of weather conditions or time of day.
- **Goals**
  - Monitoring ecosystem changes and measuring forest biomass.
  - Tracking earthquakes, landslides, and volcanic deformation.
  - Studying glacier retreat and polar ice movement.
  - Measuring soil moisture and detecting groundwater variations.
  - Generating 3D surface maps of land and ice with high precision twice every 12 days after launch.
- **Significance**
  - **Disaster response** - Rapid detection of earthquakes, floods, and landslides could help save lives and infrastructure.
  - **Agriculture and water management** - Accurate data on soil moisture and crop health can inform drought mitigation and boost food security.

- **Climate monitoring** - Continuous tracking of forests, glaciers, and wetlands enhances climate resilience.
- **Technological advancement** - Developing and operating dual-band radar technology strengthens ISRO's future missions.
- **Global data access** - All NISAR data will be freely available worldwide, enhancing India's standing in global Earth science.

### Synthetic Aperture Radar (SAR)

- SAR is a technology that uses microwave pulses instead of visible light to create high-resolution images.
- It works regardless of lighting or weather conditions like darkness, clouds, or smoke.
- A SAR system uses a small antenna on a moving platform like a satellite to record echoes from the ground.
- By combining these signals with precise timing and phase data, it mimics a very large antenna.
- **All-Weather, Day-Night Capability** - Microwaves can penetrate clouds, rain, and smoke, enabling SAR to operate 24/7.
- It can detect surface features and changes invisible to optical cameras.

### Reference

[The Hindu| NISAR First joint Satellite of NASA and ISRO](#)

## Destructive Power of the Beetle-Fungi Association

*Prelims - Current events of national and international importance | Science and technology*

### Why in News?

A recent study reported that the Ambrosia beetle has share a mutualistic relationship with two fungal species, *Fusarium ambrosia* and *Fusarium solani*.

### Ambrosia beetle

- Invasive insects which is native to Central and South America.
- **Scientific name** - *Euplatypus parallelus*.
- The species has spread to other regions, including Africa, Asia, and Oceania.
- It is a **polyphagous pest** that attacks a wide range of tree species, both broad-leaved and coniferous.
- While it primarily infests stressed or dying trees, it can also breed in healthy trees, especially in thinner trunks.
- This beetle is known for its symbiotic relationship with fungi, which it introduces into the tree, leading to potential damage and even tree death in severe cases.
- Ambrosia beetles get their name from the ambrosia fungi that call the beetle their home, is not taxonomic but ecological

- **Symbiotic relationship with fungi** - Ambrosia beetles carry and cultivate ambrosia

fungi within their galleries, which the larvae and adults feed on.

- **First reported** - In 2012, cashew trees of Ponda, Goa.
- **Process of destruction** - Attack stressed or infected trees by sensing a volatile compound of ethanol released by these trees.
- Beetles bore galleries in the bark, carry fungi into inside and farm the fungi to concentrate nutrients.
- Systemic infections progress through the plant xylem, blocking the xylem vessels.
- Fungus inside the xylem leads to sporulation, which leads to secrete several enzymes, weakening the wood strength and result in death of the plant.

*In other insect hosts, the fungi are present in sacs called mycangia. In the present study the mycangia in the ambrosia beetle is absent.*

- **Impact**
  - Weakening the structure, causing severe leaf fall, trunk drying, and in some cases even tree death.
  - Affects total latex production from rubber trees, causing economic and agricultural losses.
  - Affect other significant plants, such as coffee, cashew, mango, and coconut, vulnerable to infections.
- **Prevention** - Using antifungal agents, removing the infected part of trees, burning or chipping away any part that displays holes, and traps for ambrosia beetles.
- **Challenges**
  - Fungi reside in deeper parts of an infected plant, where insecticides or fungicides often don't reach.
  - If fungi have progressed systemically, it's difficult to save a plant.
- **Sustainable treatments** - Antagonistic fungi that can compete with the pathogens.
- Microbial consortia with a diversity of bacterial species that can live inside plants, mitigating fungal infections.

## Quick Facts

- **India** - World's sixth-largest producer of rubber and second-highest in terms of productivity.
- Kerala produces 90% and accounts for 72% of India's rubber cultivation area.

## Reference

[The Hindu| Destructive Power of the Beetle-Fungi Association](#)

## Risk of Chikungunya Epidemic

*Prelims: Current events of National & International importance and General Science.*

## Why in News?

*Recently, the World Health Organization warned that a major chikungunya virus epidemic risks sweeping around the globe, calling for urgent action to prevent it.*

- **Earlier major outbreak** - Chikungunya epidemic swept across the Indian Ocean, hit small island territories before spreading globally and affecting almost half a million people, in 2004-05.
- **Recent major chikungunya outbreaks** - Since the beginning of 2025, Reunion, Mayotte, and Mauritius have all reported One-third of the population of Reunion is estimated to have been infected.
- It is spreading to countries like Europe, Italy, France, Madagascar, Somalia, Kenya, and South Asia.
- **Chikungunya** - It is a ***mosquito-borne viral disease*** that causes fever and severe joint pain, which is often debilitating.
- **Nomenclature** - The name derives from the Kimakonde language of southern Tanzania, meaning “that which bends up” and describes the contorted posture of infected people with severe joint pain.
- **Transmission** - It is ***transmitted to humans*** by the bites of infected female mosquitoes, most commonly *Aedes aegypti* and *Aedes albopictus* mosquitoes, known as the ***tiger mosquito***
- It is venturing farther north as the world warms because of human-driven climate change.
- Bite primarily during daylight hours, ***with peak activity often in the early morning and late afternoon.***
- **Symptoms** - It causes fever and severe joint pain, which is often debilitating and may be prolonged.
- **Other symptoms** - Joint swelling, muscle pain, headache, nausea, fatigue, and rash.
- **Diagnostics** - Detected directly in blood samples collected during the first week of illness using tests such as reverse transcriptase-polymerase chain reaction (RT-PCR).
- **Treatment and vaccines** - There is no specific antiviral drug treatment for CHIKV infections.
- The clinical management includes addressing fever and joint pain with anti-pyretic and optimal analgesics, drinking plenty of fluids, and general rest.
- **Diagnosis issues** - According to the WHO, the symptoms of chikungunya are similar to those of dengue fever and Zika virus disease, making it difficult to diagnose.
- **Fatality rate** - Less than 1 % but counts thousands of deaths in a million cases.
- **Vulnerability** - Populations have little or no immunity, and the virus can quickly cause significant epidemics, affecting up to three-quarters of the population.
- **Prevention** - Control of the mosquito vectors and reduction of mosquito breeding sites.
  - Reducing mosquito breeding sites through emptying and cleaning containers that contain water weekly.
  - Disposing of waste and supporting local mosquito control programmes.

## Reference

[The Hindu| Alarm on Risk of Chikungunya Epidemic](#)

## Election to the Office of Vice President of India

*Prelims - Current Events of National and International Importance | Indian Polity & Governance.*

### Why in News?

*Recently, the resignation of Vice-President Jagdeep Dhankhar, the Election Commission of India will have to announce the election to fill the position.*

*The election of the next Vice-President is to be held **within 60 days** of the expiry of the outgoing Vice-President's term.*

- **Vice-President** - Second highest office, next to the President in the official warrant of precedence.
- **Office** - Modelled in the lines of the *American Vice-President*.
- **Source of power** - **Article 66(1)** of Indian constitution.
- **Mode of election** - ***Indirect election*** held in accordance with the system of proportional representation by means of the single transferable vote and the voting is by secret ballot.
- **Elected by** - Electoral college consist of both elected and nominated members of the Parliament.
- **Vote of choice** - Members of the Electoral College can vote according to their choice and are not bound by any party whip.
- **Winning percentage** - 50% of the valid votes + 1.
- **Qualifications**
  - Citizen of India.
  - Completed 35 years of age.
  - Qualified for election as a member of the Rajya Sabha.
  - Not hold any office of profit under any government.
- **Nomination of a candidate**
  - Supported by at least 20 electors as proposers and 20 electors as seconders as presented to the Returning officer.
  - Security deposit of Rs.15,000 in the Reserve Bank of India.
- **Condition of office**
  - He should not be a member of either House of Parliament or a House of the state legislature.
  - If such a person is elected as Vice-President, he should vacate his seat in that House on the date on which he enters the office as Vice-President.
- **Term of Office**
  - 5 years from the date on which he enters upon his office.
  - Hold office beyond his term of five years until his successor assumes charge.
  - Eligible for re-election for any number of terms.
- **Vacancy in Office**

- On the expiry of his tenure of five years.
- By his resignation.
- On his removal.
- By his death.
- Becomes disqualified to hold office or when his election is declared void.
- Constitution does not provide any method of succession apart from a fresh election.
- In such an event, the Deputy Chairman can head the Rajya Sabha proceedings.
- **Election dispute**
  - All doubts and disputes regarding the election of the Vice-President are inquired into ***and decided by the Supreme Court***, whose decision is final.
  - The election cannot be challenged on the ground that the electoral college was incomplete (i.e., the existence of any vacancy among the members of the electoral college).
  - If the election is declared void by the Supreme Court, acts done by him before such declaration are not invalidated (i.e., they continue to remain in force).

## Reference

[The Hindu| Election to the Office of Vice President of India](#)

