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RANK - 597
FORMER ASST. COMMANDANT IN BSF
CITY COLLEGE KOLKATA

OUR UPSC TOPPERS 2024



IRS SARLA JAKHER
AIR 593
CITY COLLEGE KOLKATA



IRS TANMAY
AIR 346
IIT KHARAGPUR





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DAILY CURRENT AFFAIRS-

1. Contagious Cancer Discovered in Brown Bullhead Catfish
2. Heat Storms: Giant and Prolonged Heat Waves
3. Conversion and Reservation: Supreme Court Ruling
4. Aditya-L1 Mission: New Insights into Solar Eruptions
5. Agrivoltaics: Harvesting the Sun and Powering Farms

1.Contagious Cancer Discovered in Brown Bullhead Catfish

Source: IE Page II

Subject: Science & Technology | Biotechnology | Environment

Why in News?

- Scientists have identified a fourth instance of naturally occurring contagious cancer in animals: transmissible melanoma in brown bullhead catfish.
- Researchers from the University of Vermont studied catfish in Lake Memphremagog, which lies along the US–Canada border.
- Approximately 30% of the catfish collected from the lake since 2013 were found to have this cancer, according to the supplied report.
- It is the first documented case of transmissible cancer in a freshwater fish species.

Key Findings

- Melanoma: An aggressive cancer originating in melanocytes, the skin cells responsible for producing pigment.
- Genetic evidence: Whole-genome sequencing showed that cancer cells from different fish were genetically identical to one another but distinct from the normal cells of their hosts.
- External origin: Differences in mitochondrial DNA supported the conclusion that the cancer cells originated in another fish.
- Transmission: Close physical contact during reproduction, particularly spawning, is a possible route of transmission.
- Immune evasion: The cancer cells appear capable of surviving in genetically different hosts without being rejected by their immune systems.

How Is Contagious Cancer Different from Ordinary Cancer?

- Ordinary cancer: Develops from an individual's own cells and generally does not spread directly from one individual to another.

- Contagious cancer: Living cancer cells themselves pass between individuals and continue multiplying in the new host, behaving in some respects like a transmissible parasite.
- The catfish discovery suggests that cancer cells can sometimes evade the biological barriers that normally prevent foreign cells from surviving in another animal.

Previously Known Examples

Example	Host	Key feature
Canine Transmissible Venereal Tumour (CTVT)	Dogs	Transmissible cancer affecting the genital region
Devil Facial Tumour Disease (DFTD)	Tasmanian devils	Has contributed to severe population declines
Bivalve Transmissible Neoplasia (BTN)	Molluscs	Can spread through seawater and has been observed across different mollusc species
Transmissible melanoma	Brown bullhead catfish	First documented instance in a freshwater fish species

Significance of the Discovery

- Cancer research: Helps scientists understand how cancer cells survive and proliferate in different hosts.
- Immunology: May provide insights into immune recognition and the rejection of foreign cells.
- Organ transplantation: Understanding immune evasion could inform research into tissue compatibility and transplant rejection.
- Wildlife conservation: Monitoring transmissible cancers may help assess disease risks to animal populations.

Transmissible (Clonal) Cancer

In these rare cases, the cancer cell is the "parasite." It does not involve a virus; instead, the physical transfer of living cancer cells from one individual to another leads to tumor growth in the new host.

- **Mechanism:** These cells must bypass the host's **histocompatibility barriers** (the immune system's "self vs. non-self" recognition).
- **Key Animal Examples:**
  - **Tasmanian Devil Facial Tumor Disease (DFTD):** Spread through biting during mating or fighting. It has pushed the species toward extinction due to low genetic diversity.

- **Canine Transmissible Venereal Tumor (CTVT):** A 6,000-year-old lineage of cancer cells spread through mating in dogs. Unlike DFTD, it is rarely fatal as the dog's immune system eventually rejects it.
- **Bivalve Transmissible Neoplasia:** A leukemia-like cancer found in clams and mussels, spread through seawater.

Key Fact

In mammals, only three naturally occurring transmissible cancers are known: two in Tasmanian devils and one in dogs.

2. Infection-Related Cancer (Indirect Contagion)

For humans, "contagious cancer" almost always refers to cancers caused by **oncoviruses** or bacteria. You cannot "catch" cancer cells from another person, but you can catch the pathogen that causes it.

According to 2024-2025 research data from the **IARC (International Agency for Research on Cancer)**:

- **Scale:** Roughly **1 in 8 cancer cases** (approx. 12-13%) globally are linked to infectious agents.
- **Major Pathogens:**
  - **Helicobacter pylori (H. pylori):** A bacterium responsible for the highest number of cases, primarily stomach (gastric) cancer.
  - **Human Papillomavirus (HPV):** Responsible for nearly 100% of cervical cancers and several others.
  - **Hepatitis B & C (HBV/HCV):** Leading causes of liver cancer (hepatocellular carcinoma).
  - **Epstein-Barr Virus (EBV):** Linked to lymphomas and nasopharyngeal cancer.

UPSC Prelims Practice

Q. With reference to contagious cancer in animals, consider the following statements:

1. Contagious cancer involves the transmission of living cancer cells between individuals.
2. The brown bullhead catfish case is the first documented instance of transmissible cancer in a freshwater fish species, according to the supplied report.
3. All cancers are contagious and spread between individuals through physical contact.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 and 3 only (c) 1 and 3 only (d) 1, 2 and 3

Answer: (a) 1 and 2 only

Explanation: Most cancers arise within an individual's own body and are not contagious. In transmissible cancers, cancer cells themselves spread between hosts.

UPSC Mains Practice

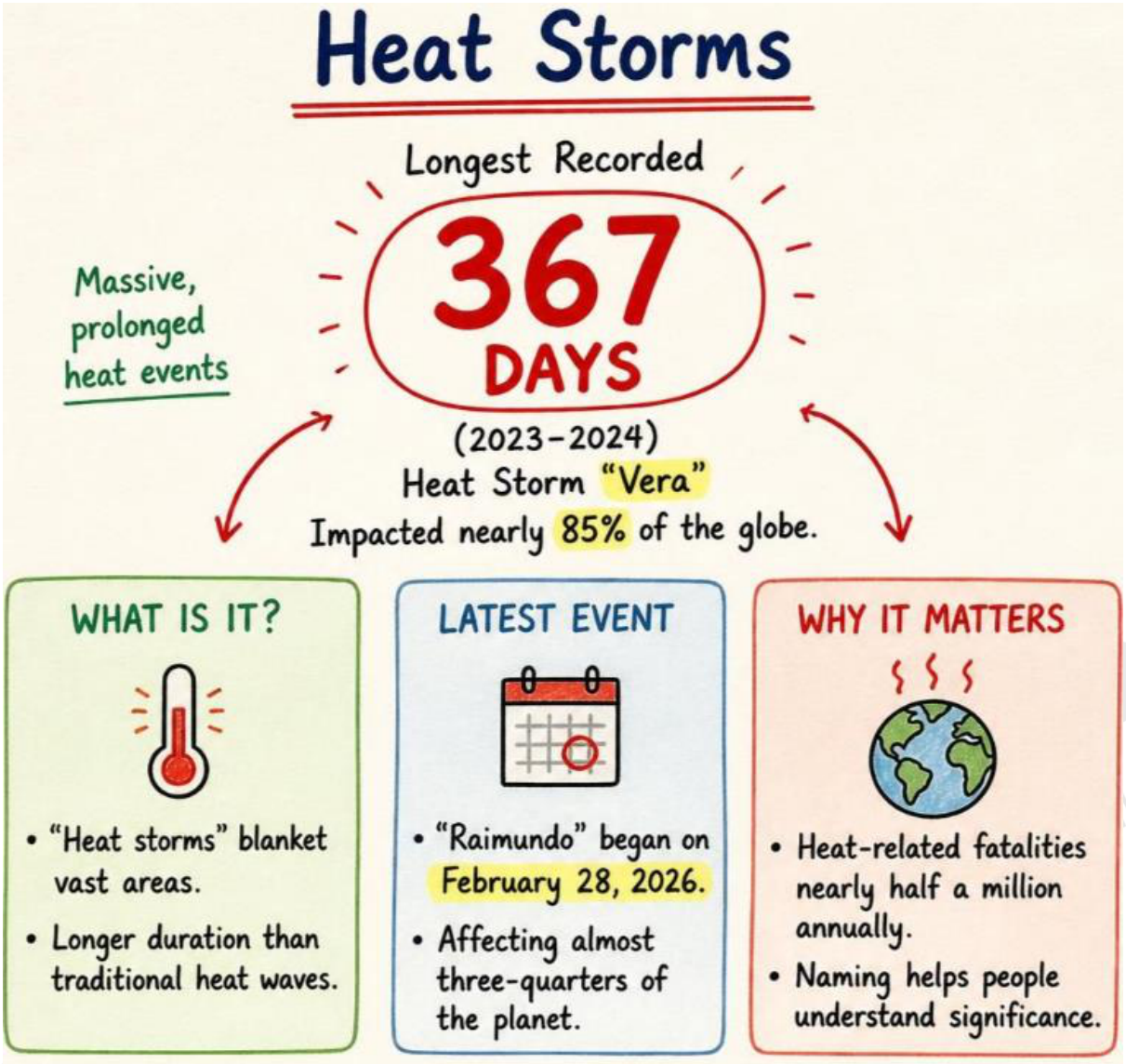
Q."Research on naturally occurring contagious cancers can improve our understanding of immune evasion and disease transmission." Discuss its significance for biotechnology, transplantation research and wildlife conservation.

2.Heat Storms: Giant and Prolonged Heat Waves

Source: The Hindu

Why in News?

- Climate researchers have introduced the concept of "heat storms" to describe extremely large and prolonged heat events affecting vast areas of the globe.
- The heat storm named Vera lasted 367 days during 2023–2024 and affected nearly 85% of the globe. Another heat storm, Raimundo, reportedly began on 28 February 2026.



Key Highlights

- Heat storms differ from conventional heat waves because of their much larger geographical spread and longer duration.
- The concept was developed through consultations with climate researchers and analysis of global temperature data since 1960.
- The duration of extreme heat events reportedly increased from around two months in the 1960s to nine months in the early 2000s.
- A "heat cascade" occurs when multiple heat storms happen consecutively or simultaneously, potentially amplifying their impacts.
- Anthony Leiserowitz, director of the Yale Program on Climate Change Communication, highlighted the role of naming such events in improving public understanding of climate risks.

- Heat-related fatalities are estimated at nearly half a million annually, highlighting the serious public-health consequences of extreme heat.
- The terminology aims to improve public understanding of global warming and the importance of limiting warming to 2°C.

3.Conversion and Reservation: Supreme Court Ruling

Source: IE, Page 8

Subject: Polity | Social Justice | Reservation Policy

Why in News?

- On October 15, 2026, the Supreme Court upheld the Madras High Court judgment invalidating a Tamil Nadu Government Order dated March 9, 2024.
- The order sought to enable persons converting to Islam from Backward Classes (BC), Most Backward Classes (MBC), Denotified Communities (DNC) and Scheduled Castes (SC) to obtain Backward Class Muslim certificates.
- The certificates were intended to enable eligible applicants to access Tamil Nadu's 3.5% reservation for BC Muslims.
- The Court held that conversion to Islam does not automatically establish membership in a separately notified Muslim backward community.

Key Findings of the Judgment

- No automatic transfer of status: A person's former caste classification does not, by itself, establish membership in a different Muslim community after conversion.
- Evidence-based assessment: Backward-class status must be assessed on the basis of relevant evidence of social and educational disadvantage rather than religious identity alone.
- Community certificate: A certificate records an existing legal status; it cannot independently create that status.
- Empirical evidence: The State's argument that converts should retain reservation benefits was not sufficient without evidence linking them to the recognised backward Muslim communities.
- Possible way forward: The ruling points towards an independent empirical assessment by the State Backward Classes Commission of the social exclusion and disadvantage experienced by converts.

Constitutional Provisions

- Article 15(4): Enables special provisions for the advancement of socially and educationally backward classes and SCs/STs.
- Article 16(4): Permits reservation in public employment for backward classes inadequately represented in State services.
- Article 341: Empowers the President to specify Scheduled Castes. Paragraph 3 of the Constitution (Scheduled Castes) Order, 1950, currently limits SC recognition to persons professing Hinduism, Sikhism or Buddhism.
- Article 342A: Deals with the identification of socially and educationally backward classes (SEBCs), including the States' and Union Territories' power to maintain their own lists for their purposes following the 105th Constitutional Amendment.

Relevant Commissions

- Mandal Commission (1979): Used social, educational and economic indicators to identify backward classes.
- Sachar Committee (2005): Examined the socio-economic and educational conditions of Muslims in India.
- Ranganath Misra Commission (2007): Recommended delinking Scheduled Caste status from religious identity.
- K.G. Balakrishnan Commission (2022): Constituted to examine the possibility of granting SC status to persons from historically Scheduled Caste communities who converted to religions not covered by the existing Presidential Order.

Significance and Way Forward

- Reservation eligibility must follow constitutional and statutory criteria rather than automatic transfer of a previous community classification.
- Governments should use reliable empirical data to assess social and educational disadvantage among different communities.
- State Backward Classes Commissions can examine whether particular groups face continuing disadvantage and meet the applicable legal criteria.
- Policymaking must balance social justice, constitutional safeguards and evidence-based identification of beneficiaries.

UPSC Prelims Practice

Q. With reference to reservation and constitutional provisions in India, consider the following statements:

1. Article 15(4) enables special provisions for the advancement of socially and educationally backward classes.
2. Article 16(4) concerns reservation in public employment for inadequately represented backward classes.
3. Article 341 empowers every State government independently to notify Scheduled Castes.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 and 3 only (c) 1 and 3 only (d) 1, 2 and 3

Answer: (a) 1 and 2 only

Explanation: Article 341 empowers the President to specify Scheduled Castes, with subsequent inclusion or exclusion governed by Parliament through law.

UPSC Mains Practice

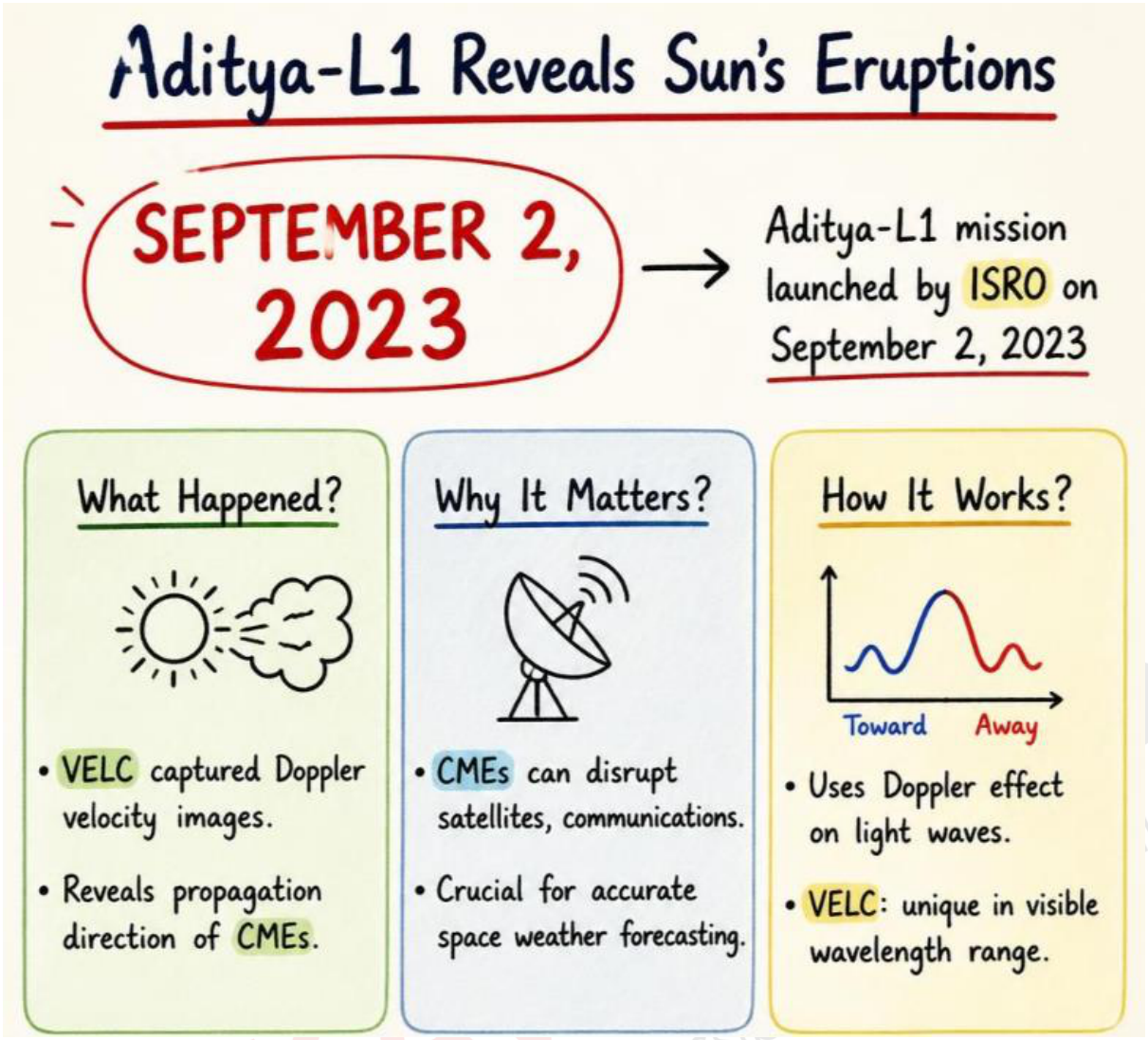
Q."Reservation policy requires a balance between constitutional safeguards and evidence-based identification of social disadvantage." Discuss in the context of the Supreme Court's ruling on conversion and Backward Class reservation in Tamil Nadu

4.Aditya-L1 Mission: New Insights into Solar Eruptions

Source: The Hindu, Page 12

Why in News?

- India's Aditya-L1 mission has generated Doppler velocity images of the solar corona using its Visible Emission Line Coronagraph (VELC) payload, helping scientists understand the propagation direction of Coronal Mass Ejections (CMEs).



Key Highlights

- Aditya-L1 was launched by ISRO on 2 September 2023 and operates in a halo orbit around the Sun–Earth Lagrange Point 1 (L1).
- The VELC payload produces spectroscopic images in the visible wavelength range, offering insights into the movement of solar plasma.
- Scientists at the Indian Institute of Astrophysics (IIA) developed software to process the VELC data.
- The Doppler effect helps determine whether solar plasma is moving towards or away from the observer by measuring changes in the wavelength of emitted light.
- Coronal Mass Ejections are massive clouds of plasma expelled from the Sun that can disturb near-Earth space and affect satellites and communication systems.
- Understanding CME propagation along the Sun–Earth line can improve space-weather forecasting and help protect technological infrastructure.

- The processed VELC images will be shared with the scientific community for further research.

Aditya-L1: India's Window to the Sun

Launched on **September 2, 2023**, via **PSLV-C57**, Aditya-L1 reached its destination—the **Lagrangian Point 1 (L1)**—on **January 6, 2024**. Since then, it has been in a "halo orbit," roughly 1.5 million km away from Earth, where it enjoys a 24/7 uninterrupted view of the Sun.

Current Mission Status (October 2026)

- **Joint Observations:** In a major milestone this month, scientists analyzed data from Aditya-L1's **VELC** alongside Europe's **Proba-3** mission to study Coronal Mass Ejections (CMEs) with unprecedented detail.
- **Doppler Imaging:** On October 20, 2024, researchers released **Doppler velocity images** of the solar corona, a first for India, helping us predict if a solar eruption is heading straight for Earth.
- **Solar Cycle Peak:** The mission is currently capturing the peak of **Solar Cycle 25**, having recorded dozens of high-intensity "X-class" flares that affect global GPS and power grids.

The "Lagrange Point" Advantage

The L1 point is a gravitational "sweet spot" where the pull of the Sun and Earth balances out the centripetal force of the satellite.

- **Fuel Efficiency:** The satellite stays stable without burning much fuel.
- **No Eclipses:** Unlike Earth-bound telescopes, there are no day-night cycles or eclipses to block the view.

Key Payloads & Objectives

The spacecraft carries **seven payloads** designed to study the Sun's layers:

1. **Visible Emission Line Coronagraph (VELC):** Studies the solar corona (the outermost layer) and CMEs.
2. **Solar Ultraviolet Imaging Telescope (SUIT):** Images the solar Photosphere and Chromosphere in near-UV.
3. **Solar Low Energy X-ray Spectrometer (SoLEXS):** Monitors soft X-ray flares.
4. **High Energy L1 Orbiting X-ray Spectrometer (HEL1OS):** Studies high-energy X-rays.
5. **ASPEX & PAPA:** These payloads study solar wind and energetic ions in-situ (at the L1 point).
6. **Advanced Tri-axial High Resolution Digital Magnetometer:** Measures the magnetic field at the L1 point.

Strategic Importance

- **Space Weather:** Solar storms can fry satellite electronics and disrupt communication. Aditya-L1 acts as an "early warning system."
- **Global Standing:** India is now among a select group of nations (like the US and Europe) with a dedicated solar observatory.

5.Agrivoltaics: Harvesting the Sun and Powering Farms

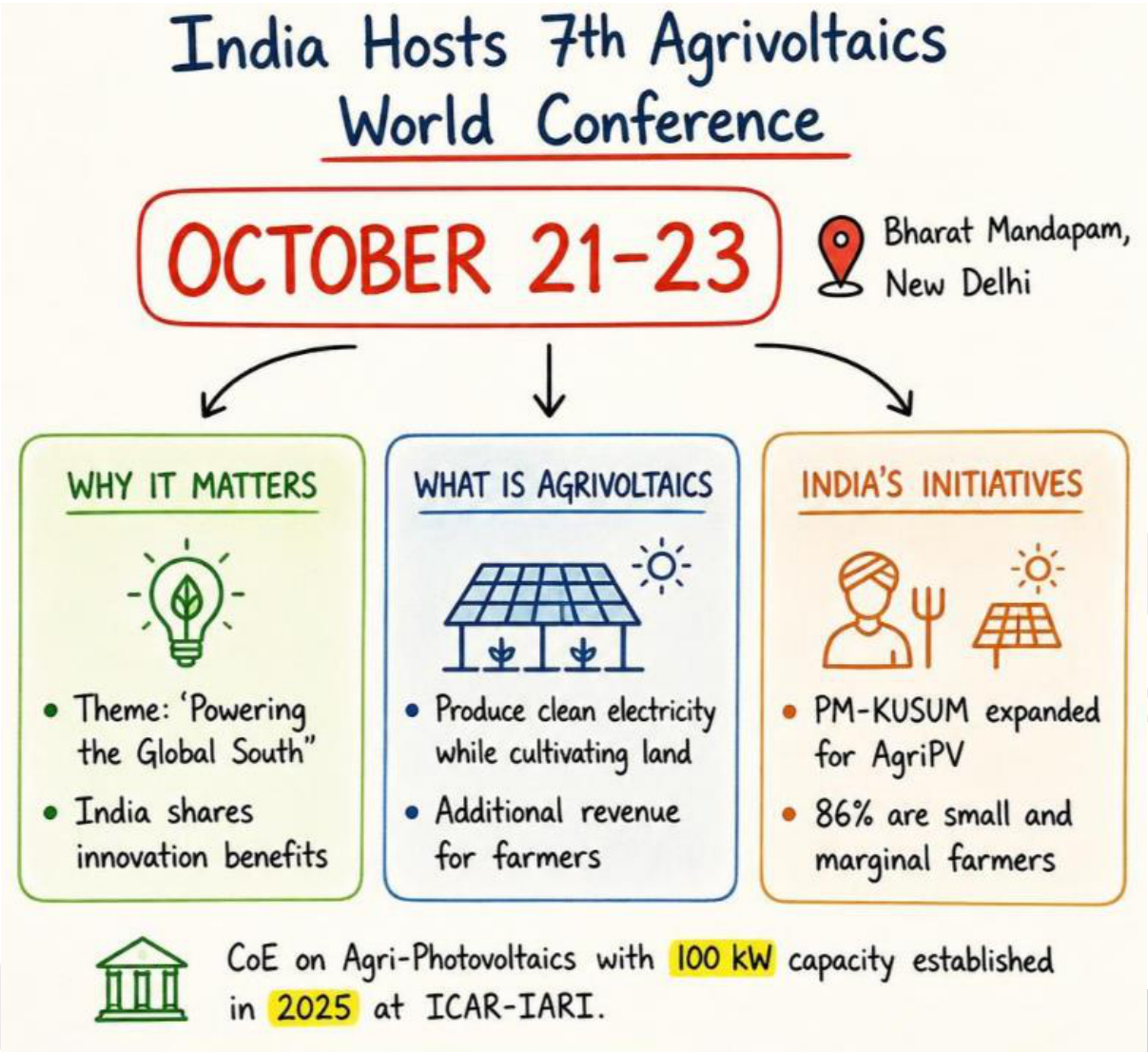
Source: The Hindu, Page 13

Why in News?

- India is hosting the 7th Agrivoltaics World Conference at Bharat Mandapam, New Delhi, from 21–23 October 2026, under the theme "Powering the Global South".
- The initiative promotes the integration of agricultural production with solar power generation to increase farmers' income and support clean energy.

Key Highlights

- Agrivoltaics (AgriPV) enables farmers to cultivate crops beneath or between solar panels while generating electricity from the same land.
- Small and marginal farmers, who constitute approximately 86% of India's farming community, are a key target group.
- The PM-KUSUM scheme is being expanded to promote AgriPV and accelerate solar energy generation.
- A 100 kW Centre of Excellence on Agri-Photovoltaics was established in 2025 at ICAR–Indian Agricultural Research Institute (IARI).
- The centre is jointly led by ICAR and the National Institute of Solar Energy (NISE), under the guidance of the Ministry of New and Renewable Energy.
- AgriPV can provide additional income from electricity generation, reduce dependence on diesel and purchased electricity, and create a microclimate that may protect crops from heat stress, drought and excessive solar radiation.
- Successful implementation requires suitable crop selection, with designs generally aiming to maintain around 70% or more of natural incoming radiation at the crop canopy.
- Research by the centre will help identify suitable crops and determine optimal integration of agricultural land and solar panels.



Challenges and Way Forward

- Successful adoption requires farmer trust, protection of land ownership and the inclusion of tenant cultivators and women farmers in project design and benefit-sharing.
- India can build on existing research by ICAR's Central Arid Zone Research Institute in Jodhpur and BAIF's Rural Innovation Centre in Pune.
- The International Solar Alliance, launched by India and France, offers opportunities for international cooperation in AgriPV research and training.

What is Agrivoltaics?

Agrivoltaics (AgriPV) is a dual-use land technology where **solar panels are mounted on elevated structures** (typically 3–4 meters high) or in spaced rows to allow crop cultivation beneath or between them. Unlike traditional solar farms that "lock" the land for 25 years, AgriPV keeps the land agriculturally productive.

1. The Core Benefits

- **Income Security:** Farmers gain a stable revenue stream through electricity sales or land leasing, shielding them from the volatility of crop prices.
- **Resource Efficiency:** Panels provide shade, which reduces **evapotranspiration** (water loss from soil). This can lower irrigation needs by up to 20-30% in arid regions.
- **Optimized Yields:** Certain crops—like leafy greens, onions, and tomatoes—thrive in the partial shade provided by panels, often showing higher quality and yield.
- **Climate Resilience:** The structures protect crops from extreme weather events like hailstorms and intense heatwaves.

2. Current Policy Landscape in India (2026)

As of late 2026, the Indian government has accelerated its focus on this sector to meet its **500 GW non-fossil target** while protecting food security.

- **PM-KUSUM 2.0:** The government is transitioning to a newer phase of the PM-KUSUM scheme, specifically incorporating incentives for "Stilt-mounted" solar under **Component A**.
- **Proposed National Agri-photovoltaics Mission:** Discussions are active regarding a dedicated mission to achieve **10 GW capacity** specifically through AgriPV.
- **AgriVoltaics World Conference:** In October 2026, India hosted the **7th Agrivoltaics World Conference** in New Delhi, signaling its intent to lead in global standards and R&D for the Global South.
- **State Initiatives:**
  - **Maharashtra:** Leading via the *Mukhyamantri Saur Krushi Vahini Yojana* (MSKVY), solarizing agricultural feeders.
  - **Gujarat:** Implementing the *Suryashakti Kisan Yojana* (SKY).

Implementation Challenges

Despite its potential, AgriPV is not without hurdles:

- **High Initial Cost:** Raising panels on stilts increases the amount of steel and engineering required.
- **Technical Knowledge Gap:** Farmers need precise guidance on which crops are **shade-tolerant** (e.g., chillies, garlic, legumes) versus those that need full sun (e.g., wheat, sugarcane).
- **Cleaning Logistics:** Dust accumulation on panels (soiling) requires cleaning; however, in AgriPV, this water can be recycled to irrigate the crops below.