

Environmental Science & Other Innovations

I. Environmental Science & Sustainability

India's Non-Fossil Fuel Power Capacity Milestone:

India has reached a significant climate milestone, achieving **50.1% of its installed electricity capacity from non-fossil fuel sources by June 2025**. This surpasses its Paris Agreement target five years ahead of schedule. The total installed power capacity is 485 GW, with 185 GW from renewables (solar, wind, small hydro, biogas), 49 GW from large hydro, and 9 GW from nuclear energy. Despite this, thermal power still produces over 70% of India's actual electricity due to intermittency of renewables and lack of sufficient storage. India is working to address grid stability issues and increase storage capacity (planning 51 GW of pumped hydro by 2032 and supporting battery storage with ₹5,400 crore).

CSIR-NEERI's Contributions to Environmental Solutions:

The CSIR-National Environmental Engineering Research Institute (CSIR-NEERI) continues to be a pioneer in environmental science and engineering in India. Their work focuses on environmental monitoring, pollution mitigation, waste management, climate change, impact assessments, and ecosystem services. They are actively involved in national priority programs like Swachh Bharat Mission, clean air initiatives, river rejuvenation, and carbon sequestration. CSIR-NEERI emphasizes decarbonization and nature-based solutions, collaborating with government, industry, and international organizations.

Plastic Pollution in India (World Environment Day 2025 Context):

While World Environment Day was in June, current discussions highlight ongoing concerns about plastic pollution in India. India produces approximately 9.3 million tonnes of plastic waste

annually, with 5.8 million tonnes openly burned, releasing toxic pollutants. The global cost of plastic pollution is estimated at USD 300–600 billion per year. Challenges include structural failures in planning, lack of awareness, and insufficient infrastructure. There's an urgent call to strengthen policies like the 2022 ban on single-use plastics and Extended Producer Responsibility (EPR) rules, improve Material Recovery Facilities (MRFs), and promote sustainable alternatives.

Kenyan Fig Trees for Carbon Sequestration:

Researchers have discovered that certain species of Kenyan fig trees (e.g., *Ficus wakefieldii*, *Ficus natalensis*, and *Ficus glumosa*) can effectively sequester carbon by literally turning parts of themselves to stone. They convert atmospheric CO₂ into calcium oxalate, which microbes then transform into limestone-like deposits (calcium carbonate) within their trunks and bark. This offers a new, potentially agricultural-friendly approach to carbon sequestration, as the carbon remains trapped in the soil much longer than organic carbon.

Plant Motor Protein (Myosin XI) Aids Drought Survival:

Scientists have discovered that a protein, myosin XI, previously thought to be merely a cellular "courier," plays a critical role in helping plants survive drought. This motor protein helps leaves close their pores (stomata) to conserve water. Plants lacking myosin XI show significantly higher water loss and impaired stomatal closure. This breakthrough could lead to the engineering of more drought-resilient crops.

Mojave Lichen Survives Lethal UVC Radiation:

Lichen from the Mojave Desert has demonstrated an astonishing ability to survive months of lethal UVC radiation. This is attributed to a microscopic "sunscreen" layer that protects their cells. This discovery has significant implications for astrobiology, suggesting that life could potentially thrive on distant

exoplanets orbiting stars that emit much stronger solar radiation than our Sun.

AI for Good Global Summit Focus on Climate: The AI for Good Global Summit (July 8-11, 2025) in Geneva also focused on how artificial intelligence can be leveraged for environmental solutions, including climate action.

II. Other Innovations

IIT Madras Unveils "YD One" - India's Lightest Active Wheelchair: On July 17, 2025, IIT Madras launched "YD One," an 8.5-kg active rigid-frame wheelchair, claiming it to be India's lightest. Made from aerospace-grade material, this minimalistic design underwent rigorous testing and was co-designed with users and clinicians. It aims to provide greater independence, portability, and maneuverability, with 20 beneficiaries (including para-athletes) already receiving the wheelchairs as part of a CSR initiative.

Dixon & Signify Form "Lightanium Technologies" JV: On July 17, 2025, Dixon Technologies and Signify formed a 50:50 Joint Venture named "Lightanium Technologies." This JV aims to consolidate their lighting businesses and significantly boost Original Equipment Manufacturer (OEM) capabilities in India's lighting industry. The move is expected to enhance operational efficiency, market expansion, and product offerings, positioning Lightanium Technologies as a major player in both domestic and global lighting OEM markets.

"Tissue Code" of Cell Behavior Discovered: Scientists have uncovered a "tissue code" of five fundamental rules that govern how cells divide, move, and die, explaining how complex organs like the colon maintain their flawless organization. These rules are: timing of cell division, order of cell division, direction of cell division and movement, how many times cells divide, and cell lifespan. This discovery, published in *Biology of the Cell* (June 19, 2025), could revolutionize

understanding of healing, birth defects, and cancer, turning static cell maps into dynamic predictions.

Natural Cancer-Fighting Sugar in Sea Cucumbers: Researchers have discovered a rare sugar compound called fucosylated chondroitin sulfate in the sea cucumber *Holothuria floridana* that shows potential in stopping cancer spread. This compound blocks the enzyme Sulf-2, which cancer cells use to grow and metastasize, without affecting blood clotting (a common side effect of other Sulf-2 inhibitors). While the low yield from sea cucumbers presents a challenge, scientists are working on synthesizing the compound for further testing.

Muon Space's FireSat Protoflight Satellite: Muon Space's FireSat Protoflight satellite, launched on March 14, is scanning the Earth every 20 minutes using advanced six-channel multispectral infrared sensors. It can detect wildfires as small as 5 meters and distinguish between different thermal signatures, providing high-resolution data for wildfire detection, tracking, and response. The constellation aims to expand to over 50 satellites by 2030, offering persistent, high-resolution intelligence globally.

MCQs

1. By June 2025, what percentage of India's installed electricity capacity came from non-fossil fuel sources, surpassing its Paris Agreement target?

- a) 40.5%
- b) 45.0%
- c) 50.1%
- d) 55.0%

Correct Answer: c) 50.1%

Explanation: The news states, "India has reached a significant climate milestone, achieving 50.1% of its

installed electricity capacity from non-fossil fuel sources by June 2025."

2. Despite India's progress in non-fossil fuel capacity, what percentage of India's actual electricity is still produced by thermal power?

- a) Over 50%
- b) Over 60%
- c) Over 70%
- d) Over 80%

Correct Answer: c) Over 70%

Explanation: The news states, "Despite this, thermal power still produces over 70% of India's actual electricity due to intermittency of renewables and lack of sufficient storage."

3. Approximately how many million tonnes of plastic waste does India produce annually?

- a) 5.8 million tonnes
- b) 7.5 million tonnes
- c) 9.3 million tonnes
- d) 12.0 million tonnes

Correct Answer: c) 9.3 million tonnes

Explanation: The news states, "India produces approximately 9.3 million tonnes of plastic waste annually..."

4. Which of the following is a mechanism by which certain Kenyan fig trees sequester carbon, as discovered by researchers?

- a) Converting atmospheric CO₂ directly into wood
- b) Releasing carbon-absorbing spores into the air
- c) Converting atmospheric CO₂ into calcium oxalate, then into limestone-like deposits
- d) Absorbing CO₂ through their roots directly from the soil

Correct Answer: c) Converting atmospheric CO₂ into calcium oxalate, then into limestone-like deposits

Explanation: The news states, "They convert atmospheric CO₂ into calcium oxalate, which microbes then transform into limestone-like deposits (calcium carbonate) within their trunks and bark."

5. What is the name of the motor protein discovered to play a critical role in helping plants survive drought by closing their stomata?

- a) Kinesin
- b) Dynein
- c) Myosin XI
- d) Actin

Correct Answer: c) Myosin XI

Explanation: The news states, "Scientists have discovered that a protein, myosin XI... plays a critical role in helping plants survive drought."

6. The survival of Mojave Lichen against lethal UVC radiation is attributed to what?

- a) A thick waxy coating
- b) A microscopic "sunscreen" layer
- c) Their ability to move underground
- d) Rapid DNA repair mechanisms

Correct Answer: b) A microscopic "sunscreen" layer

Explanation: The news states, "This is attributed to a microscopic "sunscreen" layer that protects their cells."

7. What is the weight of "YD One," the new active rigid-frame wheelchair unveiled by IIT Madras, claimed to be India's lightest?

- a) 5.0 kg
- b) 7.2 kg
- c) 8.5 kg
- d) 10.0 kg



spardhaguru2022



Spardhaguru Current affairs



Spardhaguru1



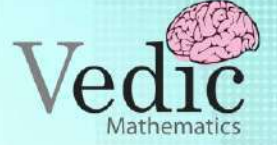
SpardhaGuru



Spardha.guru



www.spardha.guru



Correct Answer: c) 8.5 kg

Explanation: The news states, "On July 17, 2025, IIT Madras launched "YD One," an 8.5-kg active rigid-frame wheelchair..."

8. Dixon Technologies and Signify formed a 50:50 Joint Venture named what?

- a) Light Solutions India
- b) Bright Future Technologies
- c) Lightanium Technologies
- d) Illumination Innovations

Correct Answer: c) Lightanium Technologies

Explanation: The news states, "Dixon Technologies and Signify formed a 50:50 Joint Venture named "Lightanium Technologies.""

9. How many fundamental rules of cell division, movement, and death were uncovered in the "tissue code" discovery?

- a) Three
- b) Four
- c) Five
- d) Six

Correct Answer: c) Five

Explanation: The news states, "Scientists have uncovered a "tissue code" of five fundamental rules that govern how cells divide, move, and die..."

10. A natural cancer-fighting sugar, fucosylated chondroitin sulfate, was discovered in which marine animal?

- a) Jellyfish
- b) Starfish
- c) Sea cucumber
- d) Octopus

Correct Answer: c) Sea cucumber

Explanation: The news states, "Researchers have discovered a rare sugar compound called fucosylated chondroitin sulfate in the sea cucumber *Holothuria floridana*..."

11. Muon Space's FireSat Protoflight satellite can detect wildfires as small as what size?

- a) 1 meter
- b) 2 meters
- c) 5 meters
- d) 10 meters

Correct Answer: c) 5 meters

Explanation: The news states, "It can detect wildfires as small as 5 meters..."

