



Environmental Science & Other Innovations:

1. Environmental Science & Green Technologies:

EcoMat 2025 Conference (Istanbul, July 28 - August 1, 2025): The "Materials&Technologies for a Sustainable Future" conference is underway. Key focus areas include:

Development of Sustainable Materials: Creating eco-friendly, recyclable, and biodegradable materials with low environmental impact.

Energy Efficiency: Developing industrial technologies to improve energy efficiency in material production and consumption.

Waste Management and Recycling: Innovative ways to reduce waste, create material cycles, and turn waste into value.

Environmentally Friendly Production Processes: Strategies and techniques to minimize negative environmental effects of material production.

Biomaterials and Biotechnology: Innovating materials and technologies to improve living conditions for all species.

The conference aims to foster collaboration between academia, industry, and NGOs to address global environmental challenges.

Climate Change & Ocean Overheating: Scientists are reporting that the oceans are overheating, with 2023 seeing the most intense and widespread marine heatwaves ever recorded. Some events persisted for over 500 days, suggesting a potential climate tipping point.

Arctic Seasonal Shift: Scientists in Svalbard were shocked to find rain and greenery instead of snow during Arctic winter fieldwork (July 23, 2025 report). This highlights not just warming but a full seasonal shift with major consequences.

Missing Ocean Plastic Solved: Researchers have confirmed that millions of tons of plastic in the ocean aren't floating visibly, but are present as invisible, abundant microplastics.

Coral Reefs in Crisis: A new study by University of Hawai'i researchers shows Hawaiian coral reefs may face unprecedented ocean acidification within 30 years due to carbon emissions, even under conservative scenarios.

Air Pollution and Dementia Link: A sweeping review covering nearly 30 million people found that common air pollutants like PM2.5 and nitrogen may be eroding brain health and silently fueling dementia.

Top 10 Emerging Green Technologies of 2025 (as of July 20, 2025):

Tandem & Flexible Perovskite Solar Cells: Stacking perovskite on silicon to harvest more sunlight, exceeding traditional panel efficiency limits (achieved ~29% efficiency).

Solid-State Lithium-Metal Batteries & Commercial Sodium-Ion Batteries: Next-generation battery technologies for cleaner transport and grid storage.

Iron-Air "100-Hour" Batteries: Piloting a 1.5 MW / 150 MWh project promising 100 hours of discharge at a fraction of lithium-ion cost.





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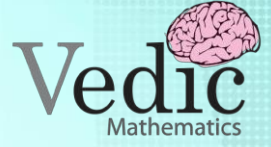
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Direct-Air Capture (DAC) with Geological Storage: Energy-intensive CO₂ removal, with Kenya-based Octavia Carbon field-testing geothermal-powered DAC units.

Green Ammonia for Shipping: Ammonia (NH₃) produced with renewable power as a promising carbon-free marine fuel.

Carbon-Negative Concrete: Scientists using seawater, electricity, and captured CO₂ to create a building block that locks away more carbon than it emits.

Power-to-Liquid Pathways (e-SAF): Turning captured CO₂ and green hydrogen into jet fuel.

Algae-based Bioplastics: Extracting polymers from seaweed and micro-algae to replace conventional polyethylene.

World Nature Conservation Day 2025: Celebrated today, emphasizing the need for collective responsibility in conserving natural resources and biodiversity, focusing on "Restoration, Resilience, and Responsibility." It highlights promoting sustainable resource use, climate action, and policy advocacy.

2. Other Innovations:

Artificial Intelligence (AI) Implementation in Governance (Gujarat, India): Gujarat has approved an action plan for AI implementation, including creating a State-level AI data repository, setting up AI development facilities, and launching pilot projects in government departments. This involves training 2.5 lakh individuals in AI and machine learning.

Thailand's "Impactful Innovation" Movement: Thailand's National Innovation Agency (NIA) launched a movement to spark national

progress, focusing on purpose-driven innovation in strategic industries like EV and green technologies, health tourism, functional foods, and the creative economy. Notable past innovations include 'Klaeng Din' (Artificial Soil Acidity) and PromptPay (digital payment infrastructure).

Climate Solutions Prize Tour (Israel & UAE): An upcoming 2025 tour for impact investors and philanthropists to Israel and the UAE aims to connect them with groundbreaking climate innovations being developed in the region.

Automated Vermicompost Unit (Ludhiana, India): Two Class XII students, Abhishek Dhandha and Prabhkirat Singh, developed "Prithvi Rakshak," a fully automated vermicomposting unit using AI-driven sensors and a bioenzyme formula to convert organic waste into high-quality compost almost three times faster (38 days vs. 60-90 days). It includes a robotic assistant (VermiDoot) and an IoT-enabled mobile app (VermiVeda).

AI in Material Recovery Facilities (MRFs): AI is transforming waste management, particularly in MRFs, by using machine learning for precise material identification (e.g., Greyparrot) and AI-powered robotic arms for faster sorting (e.g., Recycleye).

Blockchain in Waste Management: Blockchain technology is being adopted to ensure transparency and accountability in material tracking, preventing fraud and providing traceability from source to recycling.

Electrification of Waste Collection Fleets: The shift to electric waste collection vehicles (e.g., Veolia's V2G technology) is accelerating decarbonization in waste management.





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reducing CO₂e emissions, noise pollution, and improving air quality.

Urban Mining: The extraction of valuable metals (gold, silver, copper) from discarded electronic devices is growing, diverting materials from landfills and supporting a circular economy.

Integrated Logistics Platforms for Waste Management: Whole-system connectivity is improving efficiency and sustainability by linking collection, transportation, and recycling processes into seamless, data-driven systems.

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1. What is the central theme of the EcoMat 2025 Conference currently underway in Istanbul?

- a) Artificial Intelligence in Robotics
- b) Space Exploration Technologies
- c) Materials & Technologies for a Sustainable Future
- d) Cybersecurity in Industrial Systems

Answer: c) Materials & Technologies for a Sustainable Future

The news states, "The 'Materials&Technologies for a Sustainable Future' conference is underway."

2. According to scientists, what significant marine event occurred in 2023, with some instances persisting for over 500 days?

- a) Major oil spills





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- b) Unprecedented marine heatwaves
c) Decline in ocean salinity
d) Increase in deep-sea volcanic activity

Answer: b) Unprecedented marine heatwaves

The news reports, "scientists are reporting that the oceans are overheating, with 2023 seeing the most intense and widespread marine heatwaves ever recorded. Some events persisted for over 500 days..."

3. What did researchers confirm about the "missing" plastic in the ocean?

- a) It has been consumed by marine life.
b) It has sunk to the deepest parts of the ocean.
c) It is present as invisible, abundant microplastics.
d) It has degraded completely into harmless compounds.

Answer: c) It is present as invisible, abundant microplastics.

The news states, "Researchers have confirmed that millions of tons of plastic in the ocean aren't floating visibly, but are present as invisible, abundant microplastics."

4. What innovative solar cell technology is listed among the Top 10 Emerging Green Technologies of 2025, capable of exceeding traditional panel efficiency?

- a) Thin-film cadmium telluride cells
b) Concentrated solar power systems
c) Tandem & Flexible Perovskite Solar Cells
d) Amorphous silicon solar cells

Answer: c) Tandem & Flexible Perovskite Solar Cells

The news lists "Tandem & Flexible Perovskite Solar Cells: Stacking perovskite on silicon to harvest more sunlight, exceeding traditional panel efficiency limits (achieved ~29% efficiency)" as an emerging green technology.

5. Which state in India has approved an action plan for AI implementation in governance, aiming to train 2.5 lakh individuals in AI and ML?

- a) Maharashtra
b) Karnataka
c) Uttar Pradesh
d) Gujarat

Answer: d) Gujarat

The news states, "Gujarat has approved an action plan for AI implementation... This involves training 2.5 lakh individuals in AI and machine learning."

6. What is the name of the fully automated vermicomposting unit developed by two Class XII students in Ludhiana, India?

- a) Eco-Converter
b) Green Cycle Pro
c) Prithvi Rakshak
d) Bio-Composter 3000

Answer: c) Prithvi Rakshak

The news states, "Two Class XII students... developed 'Prithvi Rakshak,' a fully automated vermicomposting unit..."

7. How does AI primarily transform Material Recovery Facilities (MRFs) in waste management?

- a) By powering waste collection trucks.
b) By optimizing energy consumption in the facility.
c) By using machine learning for precise material identification and robotic arms for sorting.
d) By monitoring landfill gas emissions.

Answer: c) By using machine learning for precise material identification and robotic arms for sorting.





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The news states, "AI is transforming waste management, particularly in MRFs, by using machine learning for precise material identification (e.g., Greyparrot) and AI-powered robotic arms for faster sorting (e.g., Recycleye)."

8. What key benefit does Blockchain technology bring to waste management?

- a) It reduces the volume of waste generated.
- b) It accelerates the decomposition of organic waste.
- c) It ensures transparency and accountability in material tracking.
- d) It converts waste into energy.

Answer: c) It ensures transparency and accountability in material tracking.

The news states, "Blockchain technology is being adopted to ensure transparency and accountability in material tracking, preventing fraud and providing traceability from source to recycling."

9. What is "Urban Mining"?

- a) The extraction of minerals from underground city tunnels.
- b) The process of building new cities using recycled materials.
- c) The extraction of valuable metals from discarded electronic devices.
- d) The collection of rainwater in urban areas.

Answer: c) The extraction of valuable metals from discarded electronic devices.

The news describes "Urban Mining" as "The extraction of valuable metals (gold, silver, copper) from discarded electronic devices..."

10. What is the theme for World Nature Conservation Day 2025, celebrated today?

- a) "Go Green, Live Clean"
- b) "Restoration, Resilience, and Responsibility"
- c) "Protect Our Oceans"

d) "Forests for All"

Answer: b) "Restoration, Resilience, and Responsibility"

The news states, "...focusing on 'Restoration, Resilience, and Responsibility.'"

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