



Daily Current Affairs



To The Point

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1 Supreme Court's Wake-Up Call on Child Trafficking in India

Context: In a recent strong observation, the **Supreme Court of India** has issued a critical warning to parents and authorities, urging them to stay **vigilant against the rising menace of child trafficking**. The Court pointed out how **traffickers misuse juvenile protection laws** to coerce children into illegal activities and organized crimes.



Understanding Child Trafficking:

Child trafficking refers to the **recruitment, transportation, transfer, harboring, or receipt of a child** for the purpose of **exploitation**.

Major Forms of Child Trafficking:

- **Forced Labor:** Children are coerced into working in **domestic help, agriculture, construction**, and other labor-intensive industries.
- **Sexual Exploitation:** A significant number of children are forced into **prostitution** or **online sexual exploitation**.
- **Illegal Adoption:** **Criminal networks abduct children** and sell them under the guise of **adoption**.

Current Scenario & Statistics:

- Between **2018 and 2022**, over **10,000 cases** of child trafficking were reported, but only **1,031 convictions** were secured.
- States like **Uttar Pradesh, Bihar, and Andhra Pradesh** record the **highest number of trafficked children**.
- As per **NCRB 2022 data**, **3,098 children under 18** were rescued.

Key Challenges in Tackling Child Trafficking:

- **Low Conviction Rate:** Despite arrests, the **conviction rate is under 5%**, indicating weaknesses in **investigation and prosecution**.
- **Lack of Awareness:** Many cases remain **unreported** due to **fear, stigma**, and lack of **legal knowledge**.
- **Inter-State Criminal Networks:** Traffickers exploit **state borders**, making it hard for enforcement agencies to crack down effectively.

Legal and Institutional Framework in India:

Constitutional and Legal Safeguards:

- **Article 23 of the Indian Constitution:** Prohibits **trafficking in human beings** and **forced labor**.
- **Immoral Traffic (Prevention) Act, 1956 (ITPA):** Penalizes **trafficking**, especially for **sexual exploitation**.



- **Protection of Children from Sexual Offences (POCSO) Act, 2012:** Safeguards children from **sexual abuse** and **pornography**; establishes **special courts**.
- **Juvenile Justice (Care and Protection of Children) Act, 2015:** Identifies children at risk and ensures **rehabilitation** via **Child Welfare Committees**.
- **Bharatiya Nyaya Sanhita (BNS), 2023:**
 - **Section 143 & 144:** Relate to **human trafficking offenses**.
 - **Section 111:** Covers **organized crimes**, including **trafficking for prostitution**.
- **Bhartiya Nagarik Suraksha Sanhita (BNSS):** Recognizes trafficking as a **cognizable** and **non-bailable** offense.

Institutional Support Mechanisms:

- **Anti-Human Trafficking Units (AHTUs):** 827 units established nationwide, including in **BSF** and **SSB** forces.
- **Crime Multi Agency Centre (Cri-MAC):** A 24x7 **digital platform** by MHA to share crime data across agencies.
- **Ujjawala Scheme:** A **comprehensive program** by the **Ministry of Women and Child Development** for **rescue, rehabilitation, reintegration, and repatriation** of trafficking victims.

Global Efforts Against Child Trafficking:

- **UN Palermo Protocol (2000):** A landmark treaty to combat human trafficking through **prevention, protection, and prosecution**.
- **UNODC Global Report on Trafficking in Persons (2024):** Shows a **25% surge** in trafficking victims, with **children comprising 38%** of those affected.
- **International Labour Organization (ILO):** Works to **eliminate child labor** via programs like the **International Programme on the Elimination of Child Labour (IPEC)**.

Conclusion:

The **Supreme Court's remarks** underline the urgent need for **collective action** against child trafficking. This includes:

- **Parental awareness**
- **Swift legal action**
- **Robust enforcement**
- **Stronger inter-state coordination**

By recognizing the **magnitude of the issue**, enhancing **legal mechanisms**, and promoting **community vigilance**, India can take significant strides toward **eradicating this grave crime** and ensuring a **safe, protected future** for every child.

2 Particulate Matter Trading Scheme in Gujarat

Context: A recent study has revealed that the **Surat Emission Trading Scheme (ETS)** in Gujarat has delivered **significant environmental and economic gains**, marking a milestone in India's fight against air pollution.

Overview of the Scheme:

Launched in **2019**, the **Surat ETS** is:

- The **world's first market-based system** targeting **particulate matter (PM) emissions**.
- **India's first pollution trading scheme** of any kind.
- Based on a **cap-and-trade** model, where total emissions are **capped**, and **permits are traded** among industries.



Implemented by:

Gujarat Pollution Control Board (GPCB) in collaboration with the **Energy Policy Institute** at the **University of Chicago**.

How Does the ETS Work?

Monitoring Through Technology:

- **318 coal-using industrial units** were mandated to install **Continuous Emissions Monitoring Systems (CEMS)**.
- Real-time emissions tracking replaced outdated spot-check methods.

Cap Setting and Trading:

- GPCB set a **cap of 170 tonnes/month** based on actual CEMS data.
- **Permit Allocation:**
 - **80% of permits:** Issued for **free**, based on a unit's emissions capacity.
 - **20% of permits:** **Auctioned weekly** to promote market efficiency.
- **Penalties:** Industries that exceed their permits face **proportional fines**.

Key Achievements of Surat ETS:

Parameter	Impact
Pollution Reduction	20–30% decrease in PM emissions
Cost Efficiency	Over 10% reduction in abatement costs
Compliance	99% adherence to environmental regulations

Significance of the Programme:

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- **Environmental Innovation:** First-ever **cap-and-trade** for PM, demonstrating **India's global leadership** in innovative environmental governance.
- **Data-Driven Governance:** Use of **real-time CEMS** ensures **evidence-based policymaking** and regulatory transparency.
- **Replicability:** Proven success opens the door to **scaling** this model to other cities and pollutants like NO_x and SO₂.

Understanding Particulate Matter (PM):

Particulate matter refers to tiny solid or liquid particles suspended in the air. These particles are classified by size:

- **PM10:** Coarse particles ($\leq 10 \mu\text{m}$)
- **PM2.5:** Fine particles ($\leq 2.5 \mu\text{m}$)
- **PM0.3:** Quasi-ultrafine particles ($< 0.3 \mu\text{m}$)
- **PM0.1:** Ultrafine particles ($\leq 0.1 \mu\text{m}$)

Sources of PM:

Natural Sources:

- Dust storms
- Forest fires
- Volcanic eruptions

Anthropogenic (Human-Made) Sources:

- **Vehicle emissions**
- **Industrial pollution**
- **Construction dust**
- **Biomass & fossil fuel burning**

Health Impacts of PM Exposure:

- **Respiratory Illnesses:** Asthma, bronchitis, COPD
- **Heart Conditions:** Heart attacks, **hypertension**
- **Neurological Effects:** **Cognitive decline**, developmental issues
- **Premature Mortality:** Long-term exposure leads to **early deaths** from lung and cardiovascular diseases

Conclusion:

The **Surat PM Trading Scheme** is a **path-breaking initiative** that blends **technology, economics, and regulation** to tackle pollution. Its success is a **blueprint for other Indian cities** and a **testament to India's innovation** in environmental policy.

3 Role of V2G Technology in Strengthening India's Power Sector

Context: The Kerala State Electricity Board (KSEB), in collaboration with IIT Bombay, has launched a **pilot project** to test the integration of **Electric Vehicles (EVs)** with the state power grid through **Vehicle-to-Grid (V2G)** technology.

This initiative aims to explore how **EV batteries** can **support the grid during peak demand periods**, especially when **solar power** is unavailable—transforming EVs into **flexible energy storage units**.

What is Vehicle-to-Grid (V2G) Technology?

V2G enables **bi-directional energy flow** between **electric vehicles** and the **power grid**.

How It Works:

- **Grid-to-Vehicle (G2V):** Power flows from the grid to charge the EV.
- **Vehicle-to-Grid (V2G):** EVs send stored energy back to the grid during high-demand times.

Other Applications:

- **Vehicle-to-Home (V2H):** Powering household devices using EV batteries.
- **Vehicle-to-Vehicle (V2V):** Sharing energy between EVs.

How V2G Can Strengthen India's Power Sector:

1. Demand-Side Management:

- **Peak Load Reduction:** EVs discharge energy during peak hours, reducing stress on power stations.
- **Load Balancing:** EVs can be charged during off-peak hours, flattening demand curves.

2. Supporting Renewable Energy:

- **Energy Storage for Renewables:** Stores excess **solar** or **wind power** for later use.
- **Grid Stabilization:** Offers **frequency regulation** and **voltage support** for better reliability.

3. Enhancing Grid Flexibility:

- **Emergency Backup Power:** EVs can act as **portable power banks** during outages.
- **Decentralized Storage:** Reduces dependence on **centralized energy plants**.

4. Economic Advantages:

- **Cost Savings for EV Owners:** Earn incentives by **selling surplus energy** back to the grid.
- **Utility Efficiency:** Improves **grid reliability** and reduces operational costs.

5. Environmental Benefits:

- **Cleaner Energy Usage:** Promotes **low-carbon solutions** by integrating clean energy into everyday transport.
- **Smart Charging Systems:** Enables **real-time energy management** through **intelligent communication networks**.





Global Trends in V2G Adoption:

Growing Implementation in EV-Dense Regions:

Countries like the **USA**, **UK**, and **Netherlands** are leading the way, using V2G to boost **grid efficiency** and **renewable energy** use.

Incentivized Participation:

- **United Kingdom & Netherlands:** EV users earn compensation for grid support.
- **California, USA:** Offers incentives for contributing to **grid services** like stability and frequency regulation.

Disaster Resilience:

EVs function as **emergency energy sources** during blackouts or **natural calamities**, improving community resilience.

V2G in India: Current Landscape:

Still in Early Stages:

India's focus is currently on **building EV charging infrastructure**, with **limited V2G integration** so far.

Ongoing Pilot Programs:

Some **DISCOMs** (distribution companies) are exploring **smart charging** and **V2G models**. The **Central Electricity Authority (CEA)** has formed a **technical committee** to study reverse energy flow regulations.

Key Challenges:

- **Grid Readiness:** The current grid setup isn't fully ready for **decentralized systems**.
- **Renewable Intermittency:** Inconsistent solar/wind supply creates **balancing issues**.
- **Market Barriers:** Lack of **regulatory frameworks** and incentives.

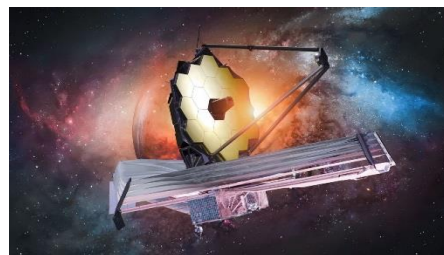
What Needs to Be Done?

To realize the full potential of V2G in India, the following steps are crucial:

- **Develop Bi-Directional Infrastructure**
- **Implement Regulatory Reforms** for energy buy-back and net metering
- **Incentivize EV Owners** to participate in energy balancing
- **Invest in Smart Charging Systems** for real-time energy coordination

4 James Webb Space Telescope (JWST): Unveiling the Secrets of the Universe

Context: The James Webb Space Telescope (JWST), launched in **December 2021**, is the most **advanced space observatory** ever constructed. It is the result of a groundbreaking collaboration between **NASA**, the **European Space Agency (ESA)**, and the **Canadian Space Agency (CSA)**.



Positioned at the **second Lagrange Point (L2)**, approximately **1.5 million kilometers** from Earth, JWST enjoys a **stable and unobstructed view** of the cosmos. Unlike the Hubble Telescope, JWST operates primarily in the **infrared spectrum**, allowing it to **peer through cosmic dust** and observe the **earliest galaxies** and **distant exoplanets** with remarkable clarity.

Key Components of JWST:

- **Optical Telescope Element (OTE)** – Gathers light from distant celestial objects.
- **Integrated Science Instrument Module (ISIM)** – Contains the powerful imaging and spectroscopic instruments.
- **Sunshield** – A five-layered structure that protects instruments from the **Sun's heat** and maintains ultra-cold temperatures.
- **Spacecraft Bus** – Supplies power, navigation, and communications for telescope operations.

A Breakthrough Discovery: Possible Signs of Life on K2-18b

What is K2-18b?

K2-18b is a **super-Earth exoplanet** located **124 light-years away** in the **Leo constellation**. It lies in the **habitable zone** of its star—where conditions might allow for **liquid water**, a crucial ingredient for life.

What Did JWST Discover?

In a recent study led by **Cambridge University researchers**, JWST detected **atmospheric chemical signatures** that may point to **biological activity** on K2-18b. Specifically, traces of:

- **Dimethyl Sulphide (DMS)**
- **Dimethyl Disulphide (DMDS)**

These compounds are **biosignature gases** on Earth—**produced primarily by marine phytoplankton and certain bacteria**. The presence of these gases in **vast quantities** (thousands of times more than Earth's levels) raises the **strong possibility** of some **life-supporting ecosystem** on this distant world.

Why This Discovery Matters:

- It's the **first time** JWST has possibly identified **biosignatures** on an **exoplanet**.
- The study provides a **new direction** for the **search for extraterrestrial life**, shifting focus to **water-rich and hydrogen-rich super-Earths**.



- K2-18b's atmosphere also contains **carbon dioxide (CO₂)** and **methane (CH₄)**, further supporting the **potential habitability** of this planet.

Did You Know?

- **JWST** can observe objects that are over **13 billion years old**, offering insights into the **early universe**.
- The telescope's mirror is made of **beryllium** and coated with **gold**, optimizing it for **infrared reflection**.
- **L2**, its orbital point, keeps the Sun, Earth, and Moon behind it, ensuring **thermal stability** and a **clear view** of deep space.

A New Era in Space Exploration:

The **James Webb Space Telescope** is not just a telescope—it's a **cosmic time machine** that is helping us answer some of the most profound questions: **Are we alone in the universe? How did the first stars form? What lies beyond our solar system?**

With findings like those on **K2-18b**, humanity is on the verge of potentially discovering **life beyond Earth**—a milestone that could **redefine our place in the cosmos**.

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Dal Lake: The Sparkling Jewel of Srinagar

Context: Recently, a **tourist shikara** tragically overturned in Srinagar's iconic **Dal Lake** as **strong winds** swept through parts of **Jammu and Kashmir**, plunging a tourist family and a boatman into the cold waters. Thankfully, rescue teams acted swiftly. This incident is a reminder of both the beauty and unpredictability of this legendary water body.



Overview of Dal Lake:

- **Dal Lake** is a **mid-altitude urban lake** located in the heart of **Srinagar**, the summer capital of **Jammu and Kashmir**.
- Cradled in the **Himalayan Pir Panjal Range**, it is often referred to as:
 - The "**Jewel in the Crown of Kashmir**"
 - Or "**Srinagar's Jewel**"
- The lake is also affectionately known as the "**Lake of Flowers**", thanks to its blooming **lotus gardens** in summer.

Geography & Structure:

- **Area:** Spans approximately **18 sq. km**, forming part of a larger **wetland ecosystem** of **21.1 sq. km**.
- **Depth:** Has an **average depth** of **5 feet**, with the **deepest point** reaching **20 feet**.
- **Shoreline:** Measures about **15.5 km**, edged by a scenic **boulevard** filled with:
 - **Mughal-era gardens**
 - **Historic parks**
 - **Luxurious houseboats**
 - **Heritage hotels**

Unique Features of Dal Lake:

- **Floating Gardens:** Known as "**Raad**" in local Kashmiri, these gardens **float atop the lake's surface**, and come alive with **lotus flowers** during **July and August**.
- **Divided Basins:** The lake is separated by natural and man-made causeways into four main basins:
 - **Gagribal**
 - **Lokut Dal**
 - **Bod Dal**
 - **Nagin** (*often considered a separate lake*)
- **Islands Within:**
 - **Lokut Dal** houses **Rup Lank (Char Chinari)** – famous for its four majestic **Chinar trees**.



- **Bod Dal** contains **Sona Lank**, another picturesque island.

Cultural & Tourist Hotspot:

- **Shikara Rides:** The lake is renowned for its colorful **Shikaras** – traditional wooden boats that glide across the serene waters.
- **Floating Markets:** Vendors sell **Kashmiri handicrafts, flowers, and fresh produce** from their Shikaras, offering tourists a unique shopping experience.
- **Houseboats:** Tourists can stay in ornately decorated **houseboats**, enjoying **sunset views** and **Kashmiri cuisine** right on the lake.

Did You Know?

- Dal Lake freezes completely during **harsh winters**, creating a surreal, icy landscape.
- The word “**Dal**” in Kashmiri actually **means “lake”**, so “Dal Lake” is technically “Lake Lake”.
- The lake has been featured in countless **Bollywood movies**, making it an iconic romantic and cultural symbol.
- **Environmental challenges**, such as encroachments and pollution, have led to multiple conservation efforts by the **Jammu and Kashmir Lakes and Waterways Development Authority (LAWDA)**.

A Living Heritage:

Dal Lake is more than just a water body—it's a **living, breathing icon of Kashmir's heritage**, ecology, and tourism economy. Whether it's the **gentle ride of a Shikara**, the **blooming lotus gardens**, or the **echo of history in Mughal gardens**, Dal Lake offers a magical experience to every visitor.

6 Shinkansen Trains & India's Bullet Train Dream

Context: In a landmark move to strengthen Indo-Japanese cooperation, Japan will provide India with two Shinkansen train sets—E5 and E3 Series—free of cost in 2026. This gesture is a part of the ongoing collaboration in India's ambitious Mumbai-Ahmedabad Bullet Train Project.

Meet the Marvels: Shinkansen E5 & E3 Series:

E5 Series – The Pinnacle of Speed and Innovation

- **Operational since 2011**, the E5 Series is a symbol of modern engineering and comfort.
- Boasts a **top speed of 320 km/h**, making it one of the fastest trains in the world.
- Features include:
 - **Aerodynamic design** for reduced drag and noise
 - **State-of-the-art safety systems**, including earthquake detection and automatic braking
 - **Luxurious seating and smooth ride quality** ideal for long-distance, high-speed travel



Fun Fact: The E5 was selected as the base model for India's bullet train line due to its cutting-edge technology and efficiency.

E3 Series – The Reliable Veteran:

- A slightly **older model**, used primarily for **Mini-Shinkansen services** in Japan.
- While not as fast as the E5, it includes similar **safety and control mechanisms**.
- Designed for **routes with converted narrow-gauge tracks**, making it versatile for semi-high-speed operations.

India's Bullet Train Project: Mumbai to Ahmedabad

India's First High-Speed Rail Corridor:

- Implemented by **National High-Speed Rail Corporation Ltd. (NHSRCL)**
- Incorporates **Japanese Shinkansen technology** to ensure top-tier infrastructure and efficiency
- **Funded up to 80% by the Japan International Cooperation Agency (JICA)** via a soft loan

Timeline & Vision:

- **Initial deadline:** 2022
- **Revised completion date:** 2028
- Total project length: **508 kilometers**, with trains expected to run at **speeds up to 320 km/h**
- A key component of **India's National Rail Plan (NRP) 2030**, aimed at transforming India's rail infrastructure

**Additional Insights & Future Scope:**

- The Shinkansen system has had **zero passenger fatalities** since its inception in 1964—a testament to its safety standards.
- The bullet train project is expected to **cut travel time** between Mumbai and Ahmedabad from **6-7 hours to just 2-3 hours**.
- The corridor will pass through **Maharashtra, Gujarat, and Dadra & Nagar Haveli**, integrating urban centers and promoting regional development.
- Once operational, it will boost:
 - **Employment opportunities**
 - **Make-in-India initiatives** via local manufacturing of components
 - **Green transportation**, reducing dependency on fossil fuels and reducing emissions

Conclusion: Speeding into the Future:

The collaboration between India and Japan on the bullet train marks not just an infrastructural milestone but a **technological and diplomatic triumph**. With the Shinkansen trains symbolizing speed, safety, and precision, India is set to take a bold leap into the era of **high-speed rail travel**.

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