DAILY CURRENT AFFAIRS 04-08-2025

GS-1

1. **Human Outer Planet Exploration (HOPE)**
2. **Mahanadi River**

GS-2

3. **Matri Van Initiative**

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4. **Market Coupling**
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Human Outer Planet Exploration (HOPE)

Syllabus: GS-1; Geography

Context

- A Bengaluru-based space tech firm, **Protoplanet**, in collaboration with the **Indian Space Research Organisation (ISRO)**, has established the **Human Outer Planet Exploration (HOPE)** analogue research station in **Tso Kar, Ladakh**.

What is HOPE?

- The **HOPE station** is an **analogue research site** designed to simulate the **geological and environmental conditions of the Moon and Mars**, enabling critical preparatory work for future **human interplanetary missions**.

Key Features of the HOPE Station:

- **Location:** Tso Kar region, Ladakh (Altitude: over 14,500 ft)
- **Reason for selection:** Its **terrain and environment closely resemble** extraterrestrial conditions, making it ideal for simulation and testing.
- **Objective:**
  - To conduct research on **habitability, life detection**, and **geological** and **geomorphological** features similar to other celestial bodies.
  - To support **crew training**, **physiological and psychological studies**, and **technology readiness** for long-duration missions.

About Analogue Research Stations:

- These are Earth-based facilities that **mimic the conditions** of space environments (e.g., Moon, Mars) to:
- Test **life-support systems**, **robotics**, and **habitat design**
- Improve **Technology Readiness Levels (TRLs)**
- Prepare for **human adaptation** and performance in isolated, confined environments

Global Context:

There are **33 analogue research stations worldwide**, including:

- **BIOS-3** (Russia)
- **HERA** (USA – Johnson Space Center)

- **SHEE** (Europe)
- **MDRS** (Mars Desert Research Station, Utah, USA)

Significance for India:

- Positions India among **nations with cutting-edge space simulation infrastructure**
- Strengthens ISRO's vision for **crewed missions to the Moon and beyond**
- Provides a vital testbed for **scientific, engineering, and crew-readiness validation** ahead of missions like **Gaganyaan** and potential **Mars human missions**

Mahanadi River

Syllabus: GS-1; Geography- Rivers

Context

- After a prolonged legal battle over the Mahanadi water dispute, both **Odisha and Chhattisgarh** have shown willingness to resolve the issue amicably, moving away from strict tribunal-based confrontation.
- The dispute was earlier referred to the **Mahanadi Water Disputes Tribunal (2018)** under the **Inter-State River Water Disputes Act, 1956**.

About Mahanadi River

Feature	Details
Type	Major east-flowing peninsular river
States Flowing Through	Chhattisgarh, Odisha (major), and parts of Jharkhand, Maharashtra, Madhya Pradesh
Ranking (Water Potential)	Second highest in peninsular India (after Godavari)
Length	Approximately 860 km
Drainage Area	Around 1,41,589 sq.km (4.3 percent of India's geographical area)
Boundaries of Basin	North - Central India hills; South and East - Eastern Ghats; West - Maikal Hills
Important Cities Along Its Course	Raipur, Sambalpur, Cuttack

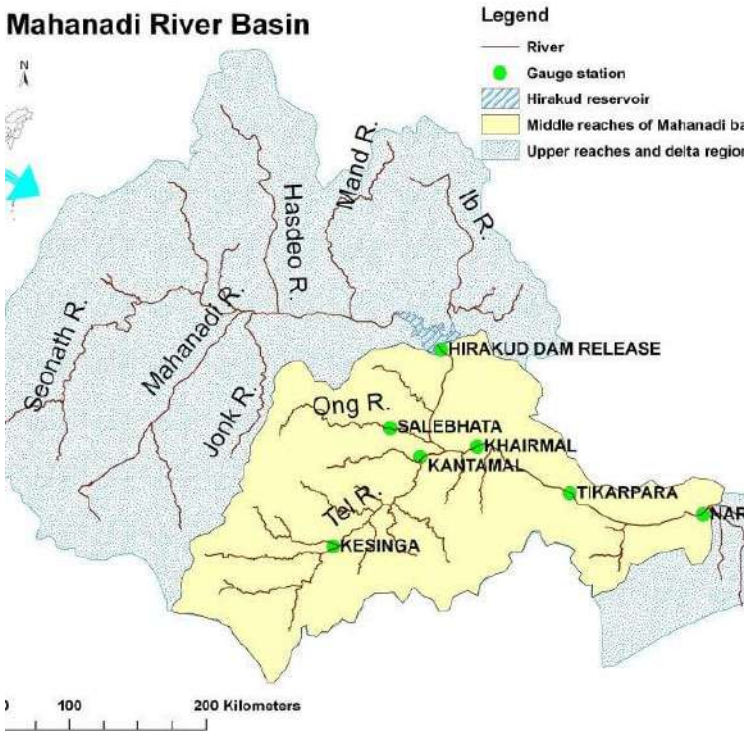
Course of the Mahanadi River

- Originates from the **Sihawa Hills (Sihawa Range)** in Dhamtari district of Chhattisgarh.
- Flows **eastward**, carving through the Eastern Ghats.
- Enters Odisha near Cuttack, spreading out and forming a large delta.
- Empties into the Bay of Bengal at False Point near Paradip through multiple distributaries.

Delta Formation

- Forms a fertile and active delta before merging with the sea.
- Known as one of the most active silt-depositing rivers in India.
- Supports paddy cultivation and mangrove ecosystems.

Major Tributaries



Tributary	Bank	Remarks
Seonath	Left	Largest tributary (Chhattisgarh)
Hasdeo	Left	Joins Seonath before Mahanadi
Mand	Left	Flows through north Chhattisgarh
Ib	Left	Near Jharsuguda

Tributary	Bank	Remarks
Ong	Left	Western Odisha
Tel	Right	Originates in Odisha
Jonk	Right	Smaller tributary in Odisha

Key Infrastructure – Hirakud Dam

- Located near Sambalpur in Odisha.
- Constructed on the Mahanadi River.
- Considered the **world's longest earthen dam** with a total length of around 26 km including dykes.
- Built for irrigation, flood control, hydroelectric power, and drinking water supply.

Chilika Lake Connection

- Chilika Lake is designated as a **Ramsar Wetland** of International Importance.
- Receives about 61 percent of its freshwater inflow from the Mahanadi River system, mainly through its distributaries **Daya and Bhargabi.**
- Essential for maintaining the brackish water balance and supports fishing and migratory bird habitats.

Ecological and Economic Significance

- Supports agriculture and fisheries in Odisha and Chhattisgarh.
- Crucial for food security due to fertile alluvial soils in the delta.
- Supports biodiversity hotspots like **Bhitarkanika National Park.**
- Prone to seasonal floods, especially in Odisha, requiring effective flood management.

Matri Van Initiative

Syllabus: GS-2; Governance, GS-3; Conservation and Sustainable Development

Context

- Union Ministers Shri Manohar Lal and Shri Bhupender Yadav preside over the Launch of 'Matri Van' Initiative in Gurugram - a theme-based Urban Forest spread over 750 acres in the Aravalli Hill area

About

- **Launched under:** *Ek Ped Maa Ke Naam* programme
- **Location:** Aravalli Hills (750 acres), along Gurugram–Faridabad Road
- **Type:** Theme-based **urban forest project**

Objectives & Vision

- Promote **urban greening** through **nature-based solutions**
- Create a **cultural-ecological space** dedicated to nurturing life like a "Mother"
- Restore **native ecology** and counter urban environmental degradation

Key Features

Component	Details
Ecological Restoration	Removal of invasive **Kabuli Kikar (Prosopis juliflora)** and plantation of **native trees** like *Dhak* and *Amaltash*
Participatory Approach	Involvement of **CSR entities, RWAs, NGOs, MNCs, schoolchildren**, and **government bodies**
Thematic Groves	Plantation zones with unique ecological and cultural themes
Green Infrastructure	Nature trails, cycling tracks, yoga areas, gazebos, sitting areas
Water Management	Creation of **waterbodies** to conserve water and reduce **urban flooding**
Smart Irrigation	Use of **treated water**, **misting**, and **sprinkling systems**
Accessibility	Public utilities and **parking areas** at four corners for better integration

Significance

Dimension	Impact
Environmental	Revives Aravalli's degraded ecology, improves biodiversity, carbon sequestration
Urban Sustainability	Enhances green cover in NCR, combats heat island effect
Community Engagement	Encourages citizen ownership of forests and public spaces
Disaster Resilience	Addresses urban flooding through green and blue infrastructure

Market Coupling

Syllabus: GS-3; Economy

Context

- The Central Electricity Regulatory Commission (CERC) has proposed implementing **Market Coupling** in the **Day-Ahead Market (DAM)** segment of power exchanges starting **January 2026**. However, industry experts suggest the reform may yield limited immediate benefits.

What is Market Coupling?

- Market Coupling is an **economic mechanism** used in electricity markets to **aggregate demand and supply bids across multiple exchanges**, thereby discovering a **uniform Market Clearing Price (MCP)** for power.
- **Current Scenario in India:**
  - India has **three major power exchanges**:
    - Indian Energy Exchange (IEX)
    - Power Exchange India Limited (PXIL)
    - Hindustan Power Exchange Limited (HPX)
  - Each exchange **collects bids independently**, resulting in **different MCPs** (usually varying by a few paise).
- **Under Market Coupling:**
  - Buy and sell bids across **all power exchanges** are **aggregated**.
  - A **single, national-level MCP** is determined.
  - Exchanges will serve only as **bid collection platforms**, while the **coupling operator** handles price discovery and dispatch coordination.

Objectives and Advantages:

- **Price Uniformity:**
  Promotes **transparent and non-discriminatory pricing** across platforms.
- **Efficiency Gains:**
  Improves **resource optimization**, reduces **grid congestion**, and enhances **energy efficiency**.
- **Market Liquidity:**
  Encourages **greater participation** and **trading volumes**, including potential cross-border electricity trade.
- **Enhanced Grid Stability:**
  Facilitates better demand-supply balancing and grid reliability.

Challenges and Concerns:

- **Implementation Readiness:**
  Concerns over **technical and institutional preparedness** of power exchanges and stakeholders.
- **Reduced Competition:**
  May dilute competitive advantage among exchanges, affecting innovation and service quality.
- **Limited Initial Benefits:**
  Given the small difference in current MCPs, actual price gains for consumers may be marginal in the short term.

Conclusion:

Market Coupling is a step toward **integrated and efficient electricity markets**, aligned with India's evolving **power sector reforms**. However, **its success will depend on regulatory clarity, stakeholder coordination**, and **technological robustness**.

Alpine Musk Deer

Syllabus: GS-3; Biodiversity

Context

- A report by the Central Zoo Authority revealed an error in species identification for conservation breeding. Efforts meant for the *Alpine Musk Deer* were mistakenly directed towards the *Himalayan Musk Deer*, raising concerns over conservation protocols.

About Alpine Musk Deer

- **Scientific Name:** *Moschus chrysogaster*
- **Family:** *Moschidae* (more closely related to *Bovidae*—antelopes, goats, bovines—than to true deer)
- **Key Features:**
  - Not a true deer; lacks antlers.
  - Males possess an externally visible **musk sac** between the testes.
  - Has **elongated canine teeth** (fangs) used during mating season for sparring.
  - Primarily **solitary** and **crepuscular** (active at dawn and dusk).
- **Diet:**
  Ruminant herbivore; primarily a browser. Feeds on:
  - Forbs, grasses, moss, lichens
  - Shoots, twigs, and leaves of shrubs

Habitat & Distribution

- **Habitat:**
  Montane ecosystems; coniferous and mixed forests at altitudes ranging from **3,000 to 5,000 metres**.
- **Geographic Range:** Found in the **Himalayan regions** of:
  - **India**
  - **Nepal**
  - **Bhutan**
  - **China**

Conservation Status

- **IUCN Red List:** *Endangered*
- **CITES:** *Appendix I*
- **Wildlife Protection Act (India), 1972:** *Schedule I*

Major Threats

- **Poaching:**
  Hunted for its high-value **musk**, widely used in:
  - Traditional medicine
  - Perfume and cosmetic industries
- **Habitat Loss and Degradation**
- **Misidentification in conservation efforts**