DAILY CURRENT AFFAIRS 04-03-2026

Mapping Perspective

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Prelims Perspective

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Debrigarh Wild Life Sanctuary

Syllabus: GS-3: Protected Areas – Wildlife sanctuary.

Context:

- Debrigarh Wildlife Sanctuary is set to host the **second edition of the two-day 'Indian Bison Fest'**.
- The festival aims to promote:
  - Eco-tourism
  - Wildlife conservation awareness
  - Local community participation

About Debrigarh Wildlife Sanctuary

Location

- Situated in **Bargarh district**, Odisha.
- Located near **Hirakud Dam** on the **Mahanadi River**.
  - Hirakud Dam is:
    - The **longest dam in India**
    - The **longest earthen dam in the world**

Historical Significance

- Associated with noted freedom fighter **Veer Surendra Sai**.
- During his rebellion against British rule:
  - His base at **Barapathara** was located within the sanctuary area.

Vegetation & Flora

Vegetation Type

- Predominantly:Mixed deciduous forests; Dry deciduous forests

Major Tree Species: Sal**;** Asana**;** Bija**;** Amla**;** Dhaura

Fauna

Mammals

- Indian leopard; Sloth bear; Chousingha (four-horned antelope); Sambar deer; Gaur (Indian Bison); Wild boar; Indian wild dog (Dhole)

Avifauna

- Important **wintering ground for migratory birds**
- Prominent species:
  - Crested serpent eagle; Flowerpeckers; Red-vented bulbul; Tree pie; Drongo; Oriental white-eye

Key Facts about Indian Bison (Gaur)

Scientific & Taxonomic Details

- Common Name: **Indian Bison / Gaur**
- Scientific Name: *Bos gaurus*
- Family: **Bovidae**
- Largest species among wild cattle.

Physical Characteristics

- Strong and massively built.
- Prominent **high grey ridge** on forehead.
- Horns:
  - Curve upward from the sides of the head.
  - Thick and sturdy.

Distribution

- Indigenous to:
  - South Asia
  - Southeast Asia
- Found in countries like India, Nepal, Bhutan, Myanmar, Thailand.

Habitat Preferences

- Evergreen and semi-evergreen forests.
- Moist deciduous forests with open grasslands.
- Prefer:
  - Hilly terrains below 1,500–1,800 m.
  - Large, undisturbed forest tracts.
  - Areas with abundant water availability.

Conservation Status: **IUCN Red List**: Vulnerable

Sulphur Dioxide

Syllabus: Prelims Bits

Context:

- Recently, it has been highlighted that **India lacks specific national emission standards for Sulphur Dioxide (SO_2)** from certain steel-sector units such as:
  - Sinter plants
  - Mill zones
- These facilities are recognised sources of SO_2 emissions, raising concerns regarding:
  - Industrial pollution regulation
  - Public health impacts
  - Environmental compliance gaps

About Sulphur Dioxide (SO_2)

Basic Characteristics

- **Chemical Formula:** SO_2
- **Nature:** Colourless gas

- **Odour:** Sharp, pungent smell (similar to a just-struck match)
- **State:**
  - Liquefies under pressure
  - Highly soluble in water

Properties of Sulphur Dioxide

- Forms **Sulphurous Acid (H_2SO_3)** when dissolved in water.
- Acts as:
  - A **reducing agent**
  - A **bleaching agent**
- Heavier than air.
- Irritating to eyes and respiratory tract.

Occurrence of Sulphur Dioxide

Anthropogenic (Human-made) Sources

- **Burning of fossil fuels** (coal, oil) in:
  - Thermal power plants
  - Industrial boilers
- **Metal smelting** (especially copper smelting)
- Steel industry processes (e.g., sinter plants)
- Petroleum refineries

The **largest atmospheric source** is fossil fuel combustion in power plants and industrial facilities.

Industrial Production

- Burning of:
  - Elemental sulphur
  - Iron pyrite (FeS_2)
  - Copper pyrite ($CuFeS_2$)

Natural Sources

- **Volcanic eruptions**
- Marine emissions (minor contribution)

Applications of Sulphur Dioxide

- Manufacture of:
  - Sulphuric acid (H_2SO_4)
  - Other sulphur-based chemicals
- Paper pulping industry
- Metal processing
- Food industry:
  - Preservative (dried fruits, wines)
- Bleaching agent in textiles and sugar refining

Impacts of Sulphur Dioxide

Human Health

- Causes:
  - Respiratory irritation
  - Bronchoconstriction
  - Aggravation of asthma
- Long-term exposure linked to:
  - Lung damage
  - Cardiovascular risks

Environmental Impact

- Major contributor to:
  - **Acid rain** (forms sulphuric acid in atmosphere)
- Leads to:
  - Soil acidification
  - Forest degradation
  - Damage to crops
  - Corrosion of monuments

Climate Impact

- Forms **sulphate aerosols**, which:
  - Reflect sunlight (short-term cooling effect)
  - Affect cloud formation

Regulatory Concern (Exam-Relevant Angle)

- India has SO_2 emission standards for:
  - Thermal power plants
- However, lack of standards for certain **steel sector processes** indicates:
  - Regulatory gaps
  - Need for sector-specific emission norms
  - Importance of continuous emission monitoring systems (CEMS)

Bureau of Energy Efficiency

Syllabus: Prelims Bits.

Context:

- The **25th Foundation Day** of the Bureau of Energy Efficiency was recently celebrated in **New Delhi**.
- BEE functions under the **Ministry of Power**.

About Bureau of Energy Efficiency (BEE)

- **Established:** 2002
- **Legal Basis:** Under the provisions of the **Energy Conservation Act**
- **Nature:** Statutory body
- **Nodal Ministry:** Ministry of Power
- **Headquarters:** New Delhi

Objective

- To **reduce energy intensity** of the Indian economy.
- Promote **energy efficiency and conservation** across sectors.

Functions and Duties

The Energy Conservation Act assigns **regulatory and promotional functions** to BEE.

Regulatory Functions

- Develop **Minimum Energy Performance Standards (MEPS)** for:
  - Equipment & appliances (under Standards & Labelling)
  - Commercial buildings

- Prescribe **Energy Consumption Norms** for **Designated Consumers** (energy-intensive industries such as cement, steel, thermal power, fertilizers etc.).
- Notify and enforce compliance mechanisms under the EC Act.

Promotional Functions

- Coordinate with:
  - Designated Consumers
  - State Designated Agencies (SDAs)
  - Other organizations
- Promote awareness and capacity building.
- Recognize and utilize existing institutional infrastructure.

Major Schemes of BEE

National Mission for Enhanced Energy Efficiency (NMEEE)

- One of the eight missions under the National Action Plan on Climate Change (NAPCC).
- Includes mechanisms like:
  - Perform, Achieve and Trade (PAT)
  - Market Transformation for Energy Efficiency (MTEE)

Energy Conservation Building Code (ECBC)

- Prescribes minimum energy performance standards for commercial buildings.
- Aims to reduce energy consumption in the building sector.

Standards and Labelling (S&L) Scheme

- Introduced the **Star Labelling Programme** for appliances.
- Helps consumers make energy-efficient purchasing decisions.

Municipal Demand Side Management (MuDSM)

- Enhances energy efficiency in urban infrastructure (street lighting, water pumping etc.).

Agricultural Demand Side Management (AgDSM)

- Promotes energy-efficient pump sets.
- Reduces electricity subsidy burden and improves DISCOM finances.

Strait of Hormuz Disruption

Syllabus: GS-1: Physical Geography – Straits - Global Choke Points

Context:

- The **Strait of Hormuz** has emerged as a flashpoint amid escalating tensions between **Iran, the United States, and Israel**.
- Even without a formal blockade, operational suspensions by shipping firms and insurers have disrupted global energy flows.
- For **India — the world's third-largest oil consumer** — any sustained disruption poses significant macroeconomic and strategic risks.

Strategic Importance of the Strait of Hormuz

- Narrow maritime chokepoint between **Persian Gulf and Gulf of Oman**.
- Handles **~20% of global petroleum and LNG trade**.
- Around **15 million barrels of crude oil per day** transit through it.
- Key exporters dependent on this route:
  - Saudi Arabia
  - Iraq

  - UAE
  - Kuwait
  - Qatar
  - Iran
- Alternative Gulf pipelines lack sufficient capacity to fully offset closure risks.

India's Energy Dependence: Structural Context

- **Crude Oil Imports**:
  - Imports **~88% of total crude requirement**.
  - ~2.5–2.7 million barrels per day (~50% of imports) pass via Hormuz.
- **LPG Imports**:
  - 80–85% imported, largely from Gulf suppliers.
- **LNG Imports**:
  - ~60% transit through Hormuz.
- Energy security directly affects:
  - Inflation
  - Current Account Deficit (CAD)
  - Rupee stability
  - Fiscal burden (subsidies)

Sector-Wise Impact Assessment

Crude Oil – Manageable in Short Term

Buffer Mechanisms:

- Indian refiners hold **10+ days of crude inventory**.
- ~7 days of refined fuel stocks.
- **Strategic Petroleum Reserves (SPR)** available for emergencies.

Diversification Options:

- Russia (including floating storage cargoes)
- United States
- West Africa
- Latin America

Assessment:

- Supply shock manageable in short term.
- However, **price shock unavoidable** if Brent crosses $100/barrel.

LPG – Major Vulnerability

- 80–85% dependence on Gulf imports.
- Limited alternative suppliers.
- No large strategic LPG reserves.

Risk:

- Supply shortage + higher subsidy burden.
- Political sensitivity due to household LPG consumption.

LNG – Limited Flexibility

- ~60% LNG imports through Hormuz.
- Spot market availability is constrained.
- No significant structural reserves.

Risk:

- Power generation disruption.
- Impact on fertiliser sector (urea production).
- Industrial slowdown.

Macroeconomic Implications

- Brent crude already crossed **$72/barrel** amid tensions.
- Prolonged disruption may push prices **above $100/barrel**.

Potential Economic Effects:

- Increase in CAD
- Imported inflation
- Rupee depreciation
- Fiscal stress (fuel subsidies)
- Growth slowdown

Why a Full Closure Is Unlikely

- Iran has historically threatened closure but never implemented it.

- Gulf economies — including Iran — rely heavily on oil export revenues.
- Naval presence of US and allied forces deters prolonged blockade.
- Closure would trigger severe global retaliation.

Thus: A temporary disruption is more plausible than a long-term shutdown.

India's Strategic Response Framework

Short-Term Measures

- Tap Strategic Petroleum Reserves.
- Accelerate cargo diversification.
- Temporary excise duty adjustments.

Medium-Term Measures

- Expand SPR capacity.
- Increase long-term LNG contracts outside Gulf.
- Strengthen rupee trade mechanisms.

Long-Term Structural Reforms

- Accelerate renewable energy transition.
- Expand green hydrogen mission.
- Promote electric mobility.
- Strengthen domestic exploration (HELP policy).

Conclusion

The disruption of the **Strait of Hormuz** underscores the structural vulnerability of India's energy architecture.

While crude oil supply shocks may be cushioned through diversification and reserves, **LPG and LNG present greater vulnerabilities** due to limited strategic buffers.

A prolonged crisis could elevate oil prices beyond $100 per barrel, intensifying inflationary and fiscal pressures.

Thus, the episode reinforces the urgency of:

- Energy diversification,
- Strategic reserve expansion, and
- Accelerated clean energy transition

— essential pillars of India's long-term energy security strategy.

ALMA Telescope

Syllabus: GS-3: Science and Technology – Space Science.

Context:

- Astronomers have captured **high-resolution images of the central region of the Milky Way**.
- Revealed a **complex network of cosmic gas filaments** in unprecedented detail.
- Observations made using **ALMA telescope** in Chile.
- Enhances understanding of:
    - **Galactic centre dynamics**
    - **Star formation processes**
    - Interstellar medium behaviour

About ALMA

- **Type**: Advanced **Radio Telescope**
- **Location**: Atacama Desert, **Northern Chile**
- **Operational Since**: 2013
- **Wavelength Range**: Millimetre & Submillimetre
- **Purpose**:
    - Study **cold universe**
    - Observe gas clouds, dust, star formation, early galaxies

Institutional Collaboration

ALMA is an international partnership among:

- National Radio Astronomy Observatory (USA)
- National Astronomical Observatory of Japan (Japan)
- European Southern Observatory (Europe)

Example of **global scientific collaboration** in astronomy.

Key Technical Features

- **66 high-precision antennas**
- Spread over **up to 16 km**
- Antennas movable (interferometry technique)

- Works like a **giant zoom lens**

- Extremely **high sensitivity**
  - Detects very faint radio emissions
- Located at **5,000 m altitude**
  - Dry atmosphere → ideal for submillimetre observations

Major Discoveries

Early Starburst Galaxies (2013)

- Showed that intense star formation began **earlier in the universe** than previously believed.

Protoplanetary Disk of HL Tauri

- Captured detailed image of disk around **HL Tauri**
- Provided evidence of **planet formation in early stellar stages**

Einstein Ring Observations

- Helped observe **Einstein Ring phenomenon**
- Caused by **gravitational lensing**
- Confirms predictions of **General Relativity**

Scientific Significance

- Studies the **cold universe** (10–100 Kelvin)
- Helps in understanding:
  - Galaxy evolution
  - Star and planet formation
  - Black hole environments
  - Molecular clouds