

## DAILY CURRENT AFFAIRS (DCA)

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### Table of Content

Challenges Ahead of Women Panchayat Members in India  
EC Addresses Concerns Over Duplicate Voter ID Numbers  
Remote Tribal Village Gets Power Connection for the First Time  
Progress of Direct Benefit Transfers  
Impact of GeM on India's Economy  
National Waterways (Construction of Jetties/ Terminals) Regulations, 2025

### NEWS IN SHORT

President Murmu visits Dholavira  
Article 136 of the Constitution  
Sources and Health Effects of PM2.5  
Link of High levels of Selenium in Wheat to Hair Loss  
Ultra-Conserved Elements (UCEs) in DNA  
Kurd Issue  
Firefly's Blue Ghost: A Historic Private Lunar Landing  
Einstein Ring  
Gene Therapy for Maple Syrup Urine Disease  
Planetary Parade  
Exercise Desert Hunt 2025

## CHALLENGES AHEAD OF WOMEN PANCHAYAT MEMBERS IN INDIA

### Context

- Recently, the **panel on the Ministry of Panchayati Raj** identified several reasons why male relatives of elected women representatives in the **Panchayati Raj System** are able to act as proxies on their behalf.

### Women in Panchayats

- The **introduction of women's reservation in Panchayati Raj Institutions (PRIs)** through the **73rd Constitutional Amendment Act, 1992**, was a landmark step toward gender equality in India's political landscape.
- It **mandated that one-third of all seats** in panchayats be **reserved for women**, enabling them to participate in grassroots governance.
- Over the years, several states have **extended it to 50%**, resulting in the presence of over 1.45 million **elected women representatives (EWRs)** in PRIs.

### Key Challenges Faced by Women Panchayat Members

- Patriarchal Mindset and Sarpanch Pati Syndrome:** In many cases, male family members, especially husbands (Sarpanch Pati), fathers, or brothers, act as de facto decision-makers, reducing elected women representatives to mere figureheads.
  - It is widely referred to as the 'Sarpanch Pati Syndrome' and is prevalent in states like **Rajasthan, Madhya Pradesh, and Bihar**.
- Lack of Political Training and Awareness:** Many women lack awareness of governance structures, financial planning, and policy implementation.
  - It hinders their decision-making capabilities, making them reliant on male counterparts or bureaucrats for governance-related matters.
- Resistance from Bureaucracy and Male Counterparts:** Many bureaucrats fail to take women leaders seriously, assuming that they lack competence or decision-making skills.
  - It creates delays in fund allocation and implementation of welfare schemes, reducing the impact of women-led governance.
- Financial Dependence and Lack of Economic Empowerment:** Most rural women remain economically dependent on male family members, which restricts their ability to function independently in politics.
  - Limited access to financial resources and micro-credit schemes further diminishes their ability to make independent decisions.

- Gender-Based Violence and Threats:** Women in politics, especially in rural areas, face **intimidation, verbal abuse, and even physical violence**.
  - Incidents of harassment by opposing male politicians or dominant caste groups discourage women from actively participating in governance.
  - In extreme cases, women are coerced into resigning from their positions.
- Dual Burden of Work and Household Responsibilities:** Women leaders struggle to balance their political responsibilities with household duties.
  - Societal expectations often burden them with domestic chores, childcare, and agricultural work, leaving them with limited time to focus on governance issues.
- Social and Caste-Based Discrimination:** Women from marginalized communities—especially Dalits, Adivasis, and Other Backward Classes (OBCs)—face intersectional discrimination.
  - It is particularly evident in Indian states like Uttar Pradesh, Bihar, and Haryana.

### Benefits of Strengthening EWRs Decision-Making Capabilities

- Improved Governance and Policy Implementation:** For example, in Kudumbashree (Kerala), empowered women leaders played a key role in implementing welfare schemes and poverty alleviation programs.
- Increased Representation and Gender-Responsive Policies:** For example, in Nagaland, women-led panchayats have focused on reducing gender-based violence and improving maternal health services.
- Financial Independence:** Example: For example, in Bihar, EWRs have successfully implemented micro-loan schemes for women entrepreneurs, boosting rural employment.
- Training for Sarpanch Pati Syndrome:** For example, in Rajasthan, training programs helped reduce cases where husbands controlled panchayat decisions.

### Key Initiatives Strengthening Women Participation in Panchayats

- National Rural Livelihood Mission (NRLM) – SHG Linkages:** It enhances leadership skills and financial independence among rural women.
- Mahila Sabhas (Women's Gram Sabha Meetings):** Organized before regular Gram Sabha meetings to prioritize women's issues in governance. These ensure that concerns related to health, education, and safety are discussed before the general Panchayat meetings.

- **Panchayat Mahila Evam Yuva Shakti Abhiyan (PMEYSA):** Aimed at capacity-building for elected women representatives (EWRs) in Panchayats to enhance their leadership skills and decision-making abilities.
- **Mission Shakti (2022):** It includes schemes like **Sambal (for safety and security)** and **Samarthya (for economic empowerment)**, which also aim to strengthen women's participation in governance structures like Panchayats.
- **Women's Leadership Development Programs (Ministry of Panchayati Raj):** Various leadership and capacity-building programs, supported by NGOs and government agencies, aim to enhance women's decision-making capabilities in Panchayats.

#### Way Forward: Strengthening Women's Political Participation

- **Capacity-Building and Leadership Training:** Initiatives like the **Rashtriya Gram Swaraj Abhiyan** (Centrally Sponsored Scheme) should be expanded to ensure that every elected woman leader is well-equipped to perform her duties.
- **Strict Implementation of Laws Against Proxy Representation:** State governments must strictly enforce laws to prevent male relatives from unofficially controlling women panchayat members.
  - ♦ Awareness campaigns should educate women about their rights and empower them to function independently.
- **Financial Empowerment and Access to Resources:** Women leaders should be given direct access to panchayat funds and financial aid without bureaucratic interference.
  - ♦ **Microfinance schemes** should be promoted to enhance their economic independence and reduce financial dependence on male family members.
- **Reservation in Higher Political Offices:** While PRIs have 33-50% reservation for women, the same should be **extended to legislative assemblies and parliamentary elections**.
  - ♦ The **Nari Shakti Vandan Adhiniyam, 2023** reserves one-third of seats for women in Lok Sabha, State Assemblies, and Delhi Assembly, but will take effect only after delimitation based on a post-enactment census.
  - ♦ It would enable more women leaders to transition from grassroots governance to state and national-level politics.

- **Strengthening Women's Support Networks:** Initiatives like the **National Federation of Elected Women Representatives (NFEWR)** should be expanded across all states.
- **Ensuring Safety and Protection for Women Leaders:** Strict measures should be implemented to protect women leaders from harassment, violence, and political intimidation.
  - ♦ **Fast-track courts** should handle cases of violence against elected women representatives.

#### Conclusion

- While women panchayat members have made significant strides in political representation, systemic barriers continue to hold them back.
- Addressing these challenges requires a multi-faceted approach that includes capacity building, legal reforms, gender sensitization, and community support.
- By empowering women representatives and ensuring their full participation in local governance, India can move closer to achieving gender equality and inclusive development.

Source: IE

## EC ADDRESSES CONCERNS OVER DUPLICATE VOTER ID NUMBERS

#### Context

- The Election Commission of India (ECI) has acknowledged concerns regarding **identical Electors Photo Identification Card (EPIC) numbers** issued to voters in different states.

#### About

- Reports of duplicate voter ID numbers raised concerns about bogus voting and electoral fraud.
- Before ERONET, states used different systems, leading to duplicate voter entries due to migration.
- ECI is working to rectify duplicate numbers and implement **ERONET 2.0 for better voter database management**.

#### What is an EPIC Number?

- EPIC (Electors Photo Identification Card) is a 10-digit alphanumeric voter ID number issued by the Election Commission of India (ECI).
- **Purpose:**
  - ♦ Proof of identity for Indian citizens aged 18+.
  - ♦ Enables access to electoral services (voter status check, information updates, applications).
  - ♦ Helps prevent fraudulent voting.



**What is ERONET?**

- ERONET (Electoral Roll Management Platform) is a web-based system ensuring a unified, accurate electoral database across India.
- **Key Features:**
  - ♦ Centralized electoral roll for all states & UTs.
  - ♦ Operates in 14 languages & 11 scripts.
  - ♦ Generates Photo Similar Entries (PSE) & Demographic Similar Entries (DSE) reports.
  - ♦ Reduces duplicate voter registrations caused by migration.

**National Electoral Rolls Purification & Authentication Program (2015)**

- **Objective:** Remove duplicate voter entries by linking EPIC data with Aadhaar.
- **Benefits of linking:**
  - Ensures one voter, one vote policy.
  - Enhance Transparency & Integrity.
  - Clean Electoral Rolls.
  - Efficient Election Management.
- **Challenges in linking:**
  - ♦ Aadhaar Errors may lead to wrongful voter deletion.
  - ♦ Aadhaar is not proof of citizenship, raising concerns about non-citizens on the rolls.
  - ♦ Privacy Risks from linking electoral rolls with Aadhaar data.

**Way Forward**

- **Public Awareness:** Educate voters on the benefits of EPIC-Aadhaar linking.
- **Address Privacy Concerns:** Assure citizens that secrecy of votes remains intact.
- **Strengthen Electoral Transparency:** Ensure trust and accuracy in the voting process.

Source: TH

**REMOTE TRIBAL VILLAGE GETS POWER CONNECTION FOR THE FIRST TIME****In News**

- Recently, a tribal village in **Male Mahadeshwara Hills, Karnataka**, received electricity for the first time, marking a milestone in ensuring **inclusivity and socio-economic progress**.

**Schemes Involved**

- Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) for rural electrification.

- ♦ **Launched:** 2014
- ♦ **Objective:** Rural electrification, feeder separation, and infrastructure strengthening.
- ♦ **Key Features:**
  - Electrification of un-electrified villages.
  - Dedicated feeders for agriculture & households.
  - Strengthening power distribution & reducing losses.
  - Subsidy: 60% (85% for special category states).

**Impact of Electrification**

- **Better Education:** With electricity, students can access digital learning tools and extend their study hours.
- **Improved Healthcare:** Health centers can now function efficiently with refrigeration for medicines and proper lighting.
- **Economic Growth:** Access to electricity fosters local businesses, irrigation, and livelihood opportunities.
- **Women Empowerment:** Reduced dependency on kerosene lamps enhances safety and supports women-led enterprises.

**Challenges & Way Forward**

- **Infrastructure Gaps:** Many remote areas still lack proper transmission infrastructure.
- **Affordability Issues:** Subsidized power and affordable tariffs are crucial for rural sustainability.
- **Renewable Energy Integration:** Expanding solar microgrids can ensure sustainable electrification.

Source: TH

**PROGRESS OF DIRECT BENEFIT TRANSFERS****In News**

- Finance Minister Nirmala Sitharaman announced that 1,100 out of 1,200 government schemes are now under **Direct Benefit Transfer (DBT), ensuring direct transfers to beneficiaries' bank accounts**.

**Need and Background of Direct Benefit Transfers**

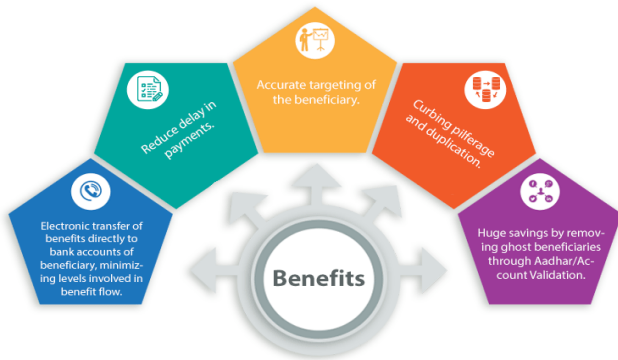
- After independence, India sought to overcome the constraints inherited from colonial rule and emerge as a global power, emphasizing centralized planning and public welfare.
- Despite the emphasis on public provisioning, there were widespread issues in accessing welfare benefits due to financial leakages, delays, and inefficiencies.

**Do you know ?**

- *Rajiv Gandhi famously noted that for every rupee spent on welfare, only 15 paise reached the intended beneficiaries, highlighting the inefficiencies in the system.*

**Direct Benefit Transfer (DBT): Timeline**

- Direct Benefit Transfer deals with transfer of benefits to the marginalized and vulnerable sections of society.



- In 2014, under Prime Minister Modi's leadership, the Direct Benefit Transfer (DBT) mission was launched, leveraging digital technologies to improve public service delivery.
- In 2014, Pradhan Mantri Jan Dhan Yojna (PMJDY) was launched to address financial inclusion.
- **JAM Trinity** : The success of PMJDY paved the way for the creation of the world's biggest targeted payments framework.

**Major Central schemes seeded with DBT**

- **PM Kisan Samman Nidhi (PM-KISAN)**: It is a Central Sector Direct Benefit Transfer (DBT) Scheme, under which, financial assistance of Rs.6000/- per annum is provided to all landholding farmer families across the country, subject to certain exclusion criteria.
- **Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)**: It aims to enhance livelihood security for rural households.
  - ♦ Its wages are credited directly to the bank/post office accounts of Mahatma Gandhi NREGS beneficiaries by the Central Government through DBT.
- **Pradhan Mantri Matru Vandana Yojna (PMMVY)**: It aims to encourage improved health-seeking behavior among Pregnant Women and Lactating Mothers (PW&LM).
  - ♦ It provides benefits to beneficiaries through Direct Benefit Transfer (DBT).
- **Pradhan Mantri Awaas Yojana- Gramin (PMAY-G)**: The PMAY-G aims at providing 2.95 crore houses to the eligible rural population in the

country so as to achieve the objective of "Housing for All".

**DBT's Impact**

- DBT schemes expanded from 28 in 2013-14 to 323 in 2024-25, with funds transferred growing nearly 1000 times, from 7,400 crores to 7 lakh crores.
- DBT has **saved around 3.5 lakh crores** by reducing leakages and inefficiencies.
- **DBT eliminated fake or duplicate beneficiaries**, using Aadhar data, with schemes like PAHAL, MGNREGS, and PDS removing over 9.2 crore ineligible beneficiaries.
- **DBT ensured timely transfer of benefits**, improving the delivery of scholarships, pensions, and social assistance, while eliminating delays and reducing dependency on government offices.
- **DBT Increased transparency and accountability** and it allowed the redesign of welfare programs such as **Swachh Bharat Mission (SBM)**, **PM-JAY (health insurance)**, and **PM-KISAN** (farmers' cash transfers).

**International Recognition**

- DBT has been praised by international organizations like the World Bank and IMF for its efficiency, reducing corruption, and broadening the reach of welfare schemes.

**Future Potential**

- The success of DBT can be leveraged to introduce more welfare schemes, and its efficiency can support innovative policies addressing broader well-being, helping India move towards becoming a developed nation by 2047.

Source :DD News

**IMPACT OF GEM ON INDIA'S ECONOMY****Context**

- The Government e-Marketplace (GeM) has revolutionized public procurement in India benefiting government buyers and small businesses alike.

**What is GeM?**

- **Government e-Marketplace (GeM)** is an online platform for public procurement in India. It was launched in **2016** by the **Ministry of Commerce and Industry** to enhance transparency, efficiency, and speed in government procurement.
- **Objective:** To create an open and transparent procurement platform for government buyers.

### Core Principles of GeM



### Key Features of GeM

- **SWAYATT** is the portal's commitment to enhance ease of doing business and establish direct market linkages to annual public procurement for startups, women entrepreneurs, Micro & Small Enterprises (MSEs), Self Help Groups (SHGs) and youth.
- **Startup Runway 2.0** is an opportunity for Startups to showcase their innovative products and services to Government buyers and engage in public procurement.
  - ♦ GeM has created a dedicated marketplace category for all Startups to list their products and services, irrespective of their **DPIIT-certification**.
- **Womaniya** initiative seeks to showcase products made by women entrepreneurs and women self-help groups [WSHG].
- GeM is collaborating with various stakeholders from the **Micro, Small and Medium Enterprises [MSME]** ecosystem with special focus on entrepreneurs from the **Scheduled Caste/Schedule Tribes [SC/ ST]**.
- **The SARAS Collection** is a pristine handcrafted collection of handicrafts, handloom textiles, office décor, furnishings, accessories, event souvenirs, personal hygiene and care products from top of the line SHGs in India.

### Impact of GeM

- **Cost Savings:** Competitive pricing has resulted in lower procurement costs for the government.
- **Wider Market Access:** Vendors from across the country, including rural areas, can register and sell their products.
- **Boost to MSMEs & Startups:** Nearly **50%** of the orders on GeM are from MSMEs, promoting small businesses.

### Concluding remarks

- The platform's strategic initiatives have significantly contributed to the **ease of doing business** and enhanced participation in government procurement.
- As GeM continues to evolve, it remains committed to its vision of creating a sustainable, open, and

competitive marketplace, driving India's progress towards inclusive and transparent public procurement practices.

Source: PIB

## NATIONAL WATERWAYS (CONSTRUCTION OF JETTIES/ TERMINALS) REGULATIONS, 2025

### Context

- The Ministry of Ports, Shipping and Waterways (MoPSW) has introduced new regulations, formulated by **Inland Waterways Authority of India (IWAI)**, to streamline processes and promote efficient use of India's vast waterways network.

### Key Highlights of the Regulations

- **The National Waterways (Construction of Jetties/Terminals) Regulations, 2025** seek to enhance private sector participation in the development of inland waterway terminals.
- Any entity, including private players, intending to develop or operate an inland waterway terminal must obtain a **No Objection Certificate (NoC)** from the IWAI.
- The regulations cover both existing and new terminals, including permanent and temporary installations.
  - ♦ **Permanent terminals** can be operated for their lifetime by the developer.
  - ♦ **Temporary terminals** will initially be granted a five-year term, with an option for extensions.
- Developers and operators are responsible for the **technical design and construction of the terminal**, ensuring alignment with their business plans and providing adequate access.

### Inland Waterways Authority of India (IWAI)

- IWAI, is an **autonomous organization** constituted in 1986 under the **Inland Waterways Authority of India Act, 1985**.
- IWAI is primarily responsible for **development, maintenance and regulation** of those waterways which have been declared as National Waterways under National Waterways Act, 2016.
- **The head office** of IWAI is located at **Noida**.

### Significance of the Inland Waterways

- **Reducing Logistics Costs:** Logistics costs in India account for 14% of GDP, significantly higher than the global average of 8-10%.

- **Decongestion:** Promoting inland waterways will help alleviate congestion and reduce the burden on these critical transport networks.
- **Eco-Friendly Transport:** Reduced fuel consumption and emissions align with India's commitment to **sustainable development goals (SDGs)** and its climate action targets.
- **Economic Benefits:** Increased cargo movement via inland waterways will bolster trade and commerce, especially in regions adjoining National Waterways.
  - ♦ The cargo movement on national waterways has surged over the last decade, from **18 million tonnes** to **133 million tonnes** in FY 2023-24.

#### Government Initiatives

- **Jalvahak scheme:** The scheme offers direct incentives to cargo owners for transporting goods via inland waterways for distances exceeding **300 km**.
  - ♦ **Reimbursement of up to 35%** of total operating expenditure incurred during cargo transportation is provided.
- **Jal Marg Vikas Project (JMVP):** Developing NW-1 with modern infrastructure and terminals.
- **Sagarmala Project:** Integration of inland waterways with coastal shipping and ports.
- **Freight Village Development:** Establishing logistic hubs near key waterways to boost multimodal transport.

#### Concluding remarks

- The National Waterways (Construction of Jetties/Terminals) Regulations, 2025 are a crucial step toward enhancing private sector participation, reducing logistics costs, and promoting eco-friendly cargo transport.
- With increased digitization and policy support, these regulations are set to improve India's waterway infrastructure, making it a more viable and competitive mode of transportation.

Source: AIR

## NEWS IN SHORT

### PRESIDENT MURMU VISITS DHOLAVIRA

#### In News

- The President of India visited the UNESCO World Heritage Site Dholavira in Gujarat.

#### About Dholavira

- **Discovery:** Discovered in 1968 by archaeologist Jagat Pati Joshi.
- **Location:** Dholavira, the southern centre of the Harappan Civilization, is sited on the arid island of Khadir in the Kachchh district, Gujarat.
  - ♦ Lies on the **Tropic of Cancer**.
- **Historical Significance:** It is the 6th largest Harappan site and flourished between **3000-1500 BCE**.
- **UNESCO Recognition:** It was inscribed in **2021** as India's **40th World Heritage Site**.



#### Dholavira's Architectural Brilliance

- The **walled city** consists of a **fortified Castle** with **attached fortified Bailey** and **Ceremonial Ground**, and a **fortified Middle Town** and a **Lower Town**.
- **A series of reservoirs** are found to the east and south of the Citadel.
- **Use of Stone:** Unlike other IVC sites, Dholavira extensively used **stone** instead of bricks.

#### Economic Significance

- **Trading Hub** for copper, shells, semi-precious stones, timber.
- **Trade Routes** linked to **Mesopotamia (Iraq)**, **Magan (Oman)**, and other IVC cities.
- Exported finished products, especially **beads, metals, and pottery**.

#### Decline of Dholavira

- **Climate Change & Aridity:** Drying up of **Saraswati River**.
- **Trade Disruptions:** Collapse of **Mesopotamian Civilization** impacted commerce.
- **Desertification:** Rann of Kutch, once navigable, became a mudflat.

Source: PIB

### ARTICLE 136 OF THE CONSTITUTION

#### In News

- Vice President Jagdeep Dhankhar, speaking at a conference on arbitration, highlighted concerns regarding the misuse of **Article 136 of the Constitution**.



### Article 136 of the Constitution

- Also called a special leave petition (SLP).
- Article 136 of the Constitution allows the Supreme Court to grant special leave to appeal from any judgment, decree, or order made by any court or tribunal in India.
- It allows the Supreme Court to entertain appeals even in cases where no other legal provision provides an automatic right of appeal.
- It can be filed in **both civil and criminal cases**.
- It is essentially a discretionary power of the Supreme Court, and the court is not bound to accept the appeal.

Source: TH

## SOURCES AND HEALTH EFFECTS OF PM2.5

### Context

- A study published in the journal Nature Communications has investigated the sources and health impacts of PM2.5 in Northern India, particularly in the Indo-Gangetic Plain.

### What is PM2.5?

- PM2.5 refers to fine particulate matter with a **diameter of less than 2.5 micrometers**.
- Due to its small size, it can penetrate deep into the respiratory system and cause severe health issues.
- It is primarily emitted from combustion activities, industrial emissions, and vehicular pollution.

### Sources of PM2.5 in Northern India

- In Delhi, **PM2.5** is dominated by **ammonium chloride and organic aerosols** from vehicular emissions, residential heating, and fossil fuel oxidation.
  - ♦ Outside Delhi, **ammonium sulfate, ammonium nitrate, and biomass-burning** derived organic aerosols are more prominent.
- **The oxidative potential of PM2.5** in Indian cities is among the highest globally, exceeding levels in Chinese and European cities by up to five times.
  - ♦ It is primarily influenced by organic aerosols from incomplete combustion of biomass and fossil fuels.
- **Cow dung combustion** during winter for heating and cooking contributes to cold-season primary organic aerosols.

### WHO air quality guideline

- They **serve as a reference for governments and organizations** to set national air quality standards and are **not legally binding**.
- Recommended Limits of Particulate Matter (PM2.5 and PM10);
  - ♦ **PM2.5:** WHO recommends an annual average limit of 5 µg/m³ and a 24-hour limit of 15 µg/m³.
  - ♦ **PM10:** The guideline suggests an annual average limit of 15 µg/m³ and a 24-hour limit of 45 µg/m³.

### Health Impacts of PM2.5

- The study highlights that **PM2.5** in Indian cities has one of the **highest oxidative** potentials globally, surpassing levels in Chinese and European cities by up to five times.
- **High PM2.5** exposure is linked to:
  - ♦ **Respiratory diseases:** Asthma, bronchitis, chronic obstructive pulmonary disease (COPD).
  - ♦ **Cardiovascular issues:** Increased risk of heart attacks and hypertension.
  - ♦ **Neurological disorders:** Cognitive decline and neurodevelopmental issues in children.
  - ♦ **Premature mortality:** Prolonged exposure increases the risk of early deaths due to lung and heart diseases.

Source: TH

## LINK OF HIGH LEVELS OF SELENIUM IN WHEAT TO HAIR LOSS

### In News

- An investigation by ICMR and AIIMS found high **selenium levels in the blood and hair of affected individuals**, linking it to wheat supplied by **Public Distribution System (PDS) outlets**.

### Selenium

- It is an **essential mineral found** in many foods and available as a dietary supplement.
- Found as a byproduct of metal sulphide ore refining, **not in pure elemental form**. It is present in **soil and groundwater** in inorganic forms, which plants convert to organic forms like selenomethionine and selenocysteine.
- It is a key component of **25 selenoproteins**, including thioredoxin reductases and glutathione peroxidases, which are involved in **thyroid**



hormone metabolism, DNA synthesis, reproduction, and protection against oxidative damage and infections.

#### Applications

- **Glassmaking:** Used to decolorize glass and produce red-colored glass/enamels.
- **Electronics:** Used in photocells, light meters, and solar cells (replaced by silicon-based devices).
- **Pigments:** Adds a red color to ceramics, paints, and plastics.
- **Rubber Industry:** Enhances rubber durability & resistance via vulcanization.

#### Selenium Toxicity (Selenosis)

- **Causes:** Overconsumption via diet, supplements, or environmental exposure.
- **Symptoms:** Including hair loss, and excessive selenium intake from food or water is the likely cause of the hair loss in Shegaon taluka.

Source: TH

## ULTRA-CONSERVED ELEMENTS (UCES) IN DNA

#### In News

- Researchers have discovered **ultra-conserved elements (UCEs)** in the genome.

#### Ultra-Conserved Elements (UCEs)

- UCEs are **DNA segments** that have **remained unchanged for over 80 million years** across species like humans, rats, mice, chickens, dogs, and fish.
- These elements are thought to have remained intact due to some biological constraint.

#### Function of UCEs

- They play a crucial role in **regulating protein production**.
- They do not code for proteins, but they influence gene expression by acting as **“poison exons” within mRNA** (it is a type of single-stranded RNA involved in protein synthesis)
- In the **Tra2b gene**, the UCE helps prevent excessive production of the Tra2 protein by causing premature termination of protein synthesis.
- The **UCE in the Tra2b gene** is crucial for fertility, maintaining a delicate balance in protein production.
  - ♦ Even a single change in the UCE could disrupt its function, explaining why it has been conserved over millions of years.

#### Research Breakthrough

- A study identified a **UCE in the mouse Tra2b gene** that plays a role in limiting protein production.
- Deleting this gene in mouse testes led to overproduction of the **Tra2β protein**, causing death of sperm-producing cells and infertility.
- Researchers used **Cre protein** to delete the UCE in the Tra2b gene in sperm-producing cells of mice.

#### Importance

- The research provides insight into the biological importance of UCEs and how their preservation across species helps regulate essential functions like fertility.
- The study marks a significant step in understanding the role of UCEs in genome stability and evolution.

#### DNA to Protein Conversion

- **DNA Structure:** Double-helix with four nitrogenous bases (Adenine (A) - Thymine (T) and Cytosine (C) - Guanine (G)).
- **Gene:** A small section of DNA that carries instructions for making a protein.
- **Transcription (DNA → mRNA):** DNA is copied into messenger RNA (mRNA).
  - ♦ mRNA leaves the nucleus and goes to the ribosome.
- **Translation (mRNA → Protein):** Ribosome reads mRNA in codons (3-base sequences).
  - ♦ Transfer RNA (tRNA) brings amino acids to build a protein.
  - ♦ Stop codon signals the end of protein synthesis.

Source: TH

## KURD ISSUE

#### Context

- The Kurdistan Workers Party (PKK) militant group declared an immediate ceasefire, a major step towards **ending a 40-year insurgency**.

#### About

- **Kurds:** Ethnic group of about 40 million, mainly in **Iran, Iraq, Syria, and Turkey**.
  - ♦ Speak various Kurdish dialects, not related to Turkish or Arabic; mostly **Sunni Muslims**.
  - ♦ **In Syria**, Kurdish-led Syrian Democratic Forces (SDF) control the northeast.

- **Concerns:** They were promised a nation post-WWI, but never granted.
  - ♦ Faced rebellions, state suppression of language and culture.
- **Insurgency:** The group launched an armed insurgency against the Turkish state in the early 1980s, originally seeking independence for the Kurds.
  - ♦ They make up **about 15%** or more of Turkey's population.
- **Peace Efforts:** Multiple efforts to end the Turkey-PKK conflict have been made, but all of them collapsed.

Source: IE

## FIREFLY'S BLUE GHOST: A HISTORIC PRIVATE LUNAR LANDING

### Context

- **Firefly Aerospace** successfully landed its **Blue Ghost** lander on the Moon, becoming the first private mission to land upright.
  - ♦ It landed near **Mons Latreille**, a volcanic formation in Mare Crisium on the Moon's northeastern near side.

### About

- Nicknamed "**Ghost Riders in the Sky**," the Blue Ghost mission is part of **NASA's Commercial Lunar Payload Services (CLPS)** program, which encourages private-sector involvement in lunar exploration.

**Private spacecraft makes Moon breakthrough**

A US company successfully landed its spacecraft on the Moon on Sunday after orbiting it for nearly 2 weeks, marking only the second private mission to achieve the milestone — and the first to do so upright

**Blue Ghost Mission 1 left Earth on January 15**

**Launched by:** US firm Firefly Aerospace on a SpaceX Falcon 9 rocket  
**Mission:** To explore the Sea of Crises, a huge crater visible from Earth  
**Touchdown:** Shortly after 3:34am US Eastern Time (2pm IST)  
**Size:** The golden lander is about the size of a hippopotamus  
**Nickname:** Ghost Riders in the Sky  
**Where:** Near Mons Latreille, a volcanic formation in Mare Crisium on the Moon's northeastern near side

**KEY PLANS OF THE MISSION**

Expected to capture HD imagery of a total eclipse on March 14 when Earth blocks the Sun from the Moon's horizon

On March 16, it will record a lunar sunset, offering insights into how dust levitates above the surface under solar influence — creating the mysterious lunar horizon glow first documented by Apollo astronaut Eugene Cernan

Landing on the Moon presents unique challenges due to the absence of an atmosphere, making parachutes ineffective. Spacecraft must rely on precisely controlled thruster burns to slow their descent

**Ten features of Blue Ghost**

- 1 **X-Band antenna**  
For 400,000km of Moon to Earth data transmission
- 2 **3 solar panels**  
Can make up to 400W & 1,470 hrs of power generation during BGM1
- 3 **6 carbon fibre tanks**  
Carry 1,000kg of propellant, including MMH, MON-3 and helium
- 4 **4 shock absorbing legs**  
These went through 100 lander leg drop tests
- 5 **1 main engine**  
Which operates at temperature of 1,350°C
- 6 **3 S-band antennas**  
Send signals to Earth at 1.3 second delay
- 7 **49 carbon fibre struts**  
They survived 35,500 N, or 348KG of loading force
- 8 **12 ACS thrusters**  
Attitude control systems help control during orbit insertion and descent
- 9 **8 RCS thrusters**  
Smaller than ACS thrusters for minute adjustment
- 10 **2 vision navigation cameras**  
Aid in precision landing without GPS

**Pioneer in private mission**

Intuitive Machines was the 1st private company to achieve a lunar landing on February 22, 2024. But the lander came down too fast and tipped over on impact. Until then, only 5 national space agencies had accomplished this feat in this order

- Soviet Union
- United States
- China
- India
- Japan

**More lunar missions**

**Blue Ghost Mission 2**  
Date: 2026  
Site: Far side of the Moon

**Blue Ghost Mission 3**  
Date: 2028  
Site: Gruithuisen Domes on the Moon's near side

**HT**

Image Courtesy: HT

- The mission aims to support **Artemis mission goals**, that aims to establish a long-term human presence on the Moon.
- The **Blue Ghost lander** is equipped with ten high-tech instruments like **lunar soil analyser, radiation-tolerant computer, drill & vacuum system** etc designed for scientific and technological research.
- **Duration:** Expected to operate for a full lunar day (14 Earth days).

### Challenges of Lunar Landings

- **Thin Atmosphere:** Unlike Mars or Earth, the Moon has an extremely thin atmosphere, requiring precise thruster control to slow down from kilometers per second to a perfect halt.
- **Rugged Lunar Terrain:** Craters, boulders, and slopes increase the risk of failure.
- **No Atmospheric Drag:** Spacecraft cannot use parachutes to slow down.

### Future Plans: More Private Landings

- **Intuitive Machines' Athena lander:** Expected to land near the Moon's south pole in the coming days
- **ispace (Japan) Resilience lander:** Another attempt following a failed mission in 2023.

#### Do you Know?

- The **Artemis Accords**, established in 2020 by the U.S. State Department and NASA, with seven founding members (Australia, Canada, Italy, Japan, Luxembourg, UAE, and the UK), set common principles for peaceful space exploration.
- They **build on the 1967 Outer Space Treaty** to govern civil use of the Moon, Mars, comets, and asteroids.
- India is a **signatory to the Artemis Accords**.

Source: TH

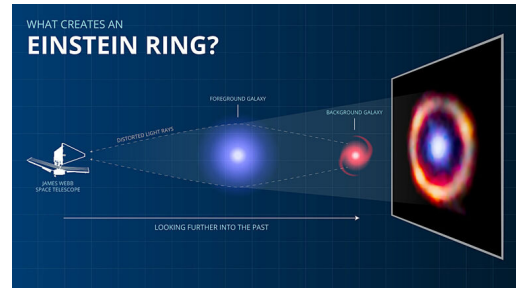
## EINSTEIN RING

### Context

- Recently, the **Euclid space mission** of the European Space Agency (ESA) spotted an **Einstein ring in the galaxy NGC 6505**, about **590 million lightyears** from the earth.

### What is an Einstein Ring?

- **Einstein's Prediction:** Light bends near massive objects due to spacetime distortion, forming the basis of his general theory of relativity.
- **An Einstein Ring** is a phenomenon that occurs when a massive object, acting as a **gravitational lens**, distorts and magnifies light from a distant background object.
  - ♦ The **light forms a circular pattern around the lens** due to perfect alignment between the distant object, the lens, and the observer. This effect is a special case of strong **gravitational lensing**.



### Significance of Einstein Rings

- **Probing Dark Matter:** Dark matter, which makes up **85% of the universe's total matter**, does not emit or absorb light, making it difficult to observe directly.
  - ♦ Einstein rings provide indirect evidence of dark matter's gravitational influence.
- **Understanding Distant Galaxies:** These rings help scientists study galaxies that would otherwise be too faint or distant to observe.
- **Insights into Cosmic Expansion:** The bending of light provides crucial data about the expansion of the universe, as the space between celestial bodies is continuously stretching.

#### Euclid Mission (2023)

- **Mission:** To explore the **composition and evolution of the dark Universe**.
- **Objective:** Create a map of the Universe's large-scale structure across space and time.
  - ♦ Observing billions of galaxies up to 10 billion light-years away, covering over a third of the sky.
- **Focus Areas:** Investigating the expansion of the Universe, structure formation, and the roles of gravity, dark energy, and dark matter.

Source: TH

## GENE THERAPY FOR MAPLE SYRUP URINE DISEASE

### Context

- Scientists have created a new gene therapy for a debilitating genetic disorder called maple syrup urine disease (MSUD).

### Maple Syrup Urine Disease (MSUD)

- MSUD is a rare genetic disorder characterized by deficiency of an enzyme complex, **Branched-Chain Alpha-Keto Acid Dehydrogenase (BCKDH)**.
  - ♦ This complex is crucial for breaking down branched-chain amino acids—**leucine, isoleucine, and valine**.



- The absence or malfunction of this complex leads to the accumulation of toxic metabolites, resulting in severe **neurological damage** and, in extreme cases, death.
- **Characteristic Odor:** The disease gets its name from the distinct sweet smell in the urine of affected individuals.
- **Treatment Options:** Dietary Management and Liver Transplantation.

#### New Gene Therapy

- Scientists have introduced a gene replacement therapy for two types of classic MSUD using an **adeno-associated viral (AAV) vector** to deliver functional copies of the **BCKDHA and BCKDHB** genes.
- The therapy successfully restored metabolic function in knockout cells.

Source: TH

## PLANETARY PARADE

#### In News

- February 28, 2025, witnessed a rare planetary parade.

#### What is a Planetary Parade?

- A celestial event where multiple planets appear in a straight line in the night sky.

- **Planets in Alignment:** Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune.

Source: TH

## EXERCISE DESERT HUNT 2025

#### Context

- The Indian Air Force conducted **Exercise Desert Hunt 2025**, an integrated Tri-Service Special Forces exercise, at Air Force Station Jodhpur, Rajasthan.

#### About

- The exercise involved **Para (Special Forces)** of the Indian Army, **Marine Commandos (MARCOS)** of the Indian Navy, and **Garud (Special Forces)** of the Indian Air Force.
- It aimed to **enhance interoperability, coordination, and synergy** among the three Special Forces units for **swift and effective responses** to security challenges.
- **Key operations included:** airborne insertion, precision strikes, hostage rescue, counter-terrorism operations, combat free falls and urban warfare scenarios wherein the combat readiness of the forces was tested under realistic conditions.

Source: PIB

