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Examination-oriented and clear

APRIL 2026

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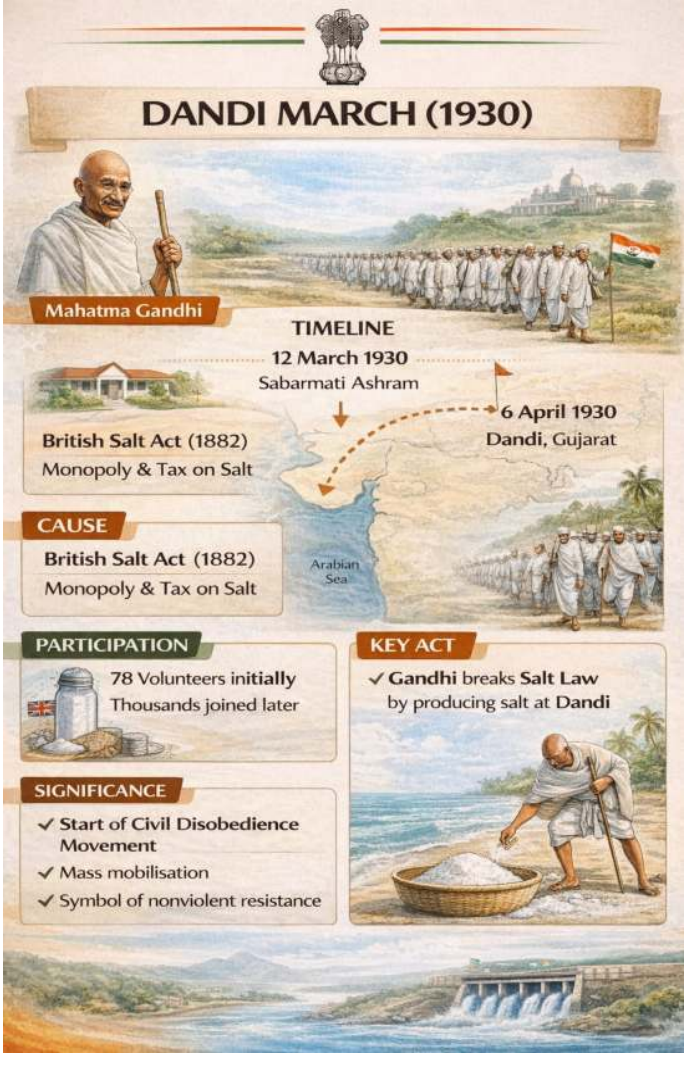
Contents

DANDI MARCH (1930)



CONTEXT

According to the **Press Information Bureau (PIB)**, Prime Minister Narendra Modi recently honoured the participants of the historic **Dandi March**, recalling its enduring message of **truth, sacrifice, and nonviolent resistance**. The Dandi March remains one of the most significant events in India's freedom struggle and marked the **launch of the Civil Disobedience Movement (CDM)** against British colonial rule.

WHAT WAS THE DANDI MARCH?

The **Dandi March**, also known as the **Salt March** or **Dandi Satyagraha**, was a **nonviolent protest led by Mahatma Gandhi in 1930** against the British monopoly on salt production and the heavy tax imposed on it.

The march began from **Sabarmati Ashram (Ahmedabad)** on **12 March 1930** and concluded at the coastal village of **Dandi in Gujarat on 6 April 1930**. At Dandi, Gandhi symbolically **broke the British Salt Law by producing salt from seawater**, thereby launching the **Civil Disobedience Movement** across India.

BACKGROUND AND CAUSES

Salt Act of 1882

The **Salt Act, 1882** gave the British government **exclusive control over salt production and distribution** and imposed a tax on salt. This tax disproportionately affected the poor, as salt was a **basic necessity for all sections of society**.

Gandhi's Eleven Demands

In **January 1930**, Mahatma Gandhi presented **11 demands** to the Viceroy, **Lord Irwin**, which included:

- Abolition of the salt tax
- Reduction in land revenue
- Protection for Indian textile industries
- Release of political prisoners

When these demands were ignored, Gandhi announced a campaign of **civil disobedience**.

THE MARCH AND PARTICIPATION

The march began with **78 carefully selected volunteers from Sabarmati Ashram**. Gandhi and his followers walked **about 240 miles (approximately 390 km)** over **24 days**, passing through numerous villages in Gujarat.

As the march progressed, **thousands of people joined the movement**, transforming it into a mass national protest. The symbolic act of **breaking the salt law at Dandi** inspired widespread civil disobedience, including salt production, boycott of British goods, and refusal to pay certain taxes.

WHY SALT WAS CHOSEN

Gandhi deliberately selected **salt as the central issue** because:

- It was **essential for every individual**, rich or poor.
- The tax represented **economic exploitation by the British**.
- It had the potential to **unite Indians across caste, class, and religious divisions**.

SIGNIFICANCE

- **Beginning of Civil Disobedience Movement (1930–34)**
- Demonstrated the power of **nonviolent mass mobilisation**.
- Drew **global attention to India's independence struggle**.
- Inspired similar protests across India and strengthened nationalist unity.

The Dandi March thus became a defining moment in India's freedom movement and a powerful symbol of **peaceful resistance against unjust laws**.

SOCIETY

GS PAPER 1

WOMEN-LED DEVELOPMENT IN INDIA: DRIVING INCLUSIVE GROWTH

CONTEXT

International Women's Day, observed every year on **8 March**, celebrates women's achievements and calls for accelerated gender equality. The first observances took place in **Europe in 1911**, and the **United Nations officially recognised the day in 1977**.

The **2026 theme – "Rights. Justice. Action. For ALL Women and Girls"** highlights the need to dismantle structural barriers to equality. In India, policy discourse has shifted from **"development for women" to "women-led development"**, positioning **Nari Shakti** as a key driver of the **Viksit Bharat @2047** vision.

INDIA'S KEY INITIATIVES FOR WOMEN-LED DEVELOPMENT

1. Gender Budgeting

The Union Budget **2026–27 allocated ₹5.01 lakh crore (9.37% of total expenditure)** towards programmes promoting women's empowerment, reflecting the government's commitment to gender-responsive policymaking.

2. Strengthening Women's Rights

The **106th Constitutional Amendment (Women's Reservation Act, 2023)** reserves **33% seats in Parliament and State legislatures** for women, enhancing their political representation. In addition, legal reforms such as the **criminalisation of instant Triple Talaq** aim to safeguard women's dignity and rights.

3. Rural Economic Empowerment

Under the **Deendayal Antyodaya Yojana – National Rural Livelihoods Mission (DAY-NRLM)**, more than **10 crore women** have been mobilised into Self-Help Groups (SHGs). The programme has also enabled **over 3 crore women to become "Lakhpati Didis"**, earning sustainable annual incomes of at least ₹1 lakh.

4. Technology and Innovation

The **NaMo Drone Didi Scheme** provides **15,000 SHGs with agricultural drones with 80% subsidy**, enabling women to participate in precision agriculture and modern rural enterprises.

5. Financial Inclusion and Entrepreneurship

Women account for **68% of loans under the Pradhan Mantri MUDRA Yojana**, while the **Stand-Up India scheme** has supported over **2 lakh women entrepreneurs** in establishing greenfield enterprises.

6. Education and Savings for Girls

The **Sukanya Samriddhi Yojana** has mobilised approximately **₹3.33 lakh crore in savings**, promoting long-term financial security and supporting girls' education.

KEY ACHIEVEMENTS IN WOMEN'S EMPOWERMENT

Grassroots Leadership: Women constitute **nearly 50% of representatives in Panchayati Raj Institutions**, strengthening democratic participation.

Educational Advancement: Female tertiary enrolment reached **2.18 crore with a GER of 30.2**, while women form **53% of UGC-NET JRF scholars in STEM disciplines**.

Maternal Health Improvements: Initiatives such as **Janani Suraksha Yojana (JSY)** and **Pradhan Mantri Matru Vandana Yojana (PMMVY)** reduced India's **Maternal Mortality Ratio from 130 to 88**.

Financial and Skill Inclusion: Women hold **56% of Pradhan Mantri Jan Dhan Yojana accounts** and constitute **45% of beneficiaries under Pradhan Mantri Kaushal Vikas Yojana (PMKVY)** training programmes.

Leadership Milestones: In **2025**, the **first women cadets graduated from the National Defence Academy**, reflecting expanding opportunities in defence and scientific sectors, including leadership roles in **ISRO research programmes**.

CONCLUSION

India's transition towards **women-led development** marks a paradigm shift in governance. By strengthening women's participation in **politics, education, entrepreneurship, and technology**, the country is harnessing the transformative potential of **Nari Shakti**. Sustained investment in gender equality will be crucial for achieving **inclusive growth and the vision of Viksit Bharat @2047**.

COMBATING HATE SPEECH: CONSTITUTIONAL AND JUDICIAL SAFEGUARDS

CONTEXT

Rising instances of hate speech in India have raised serious concerns about social harmony, constitutional morality, and public order. The issue has placed the judiciary at the centre of balancing freedom of speech under Article 19(1)(a) with the need to protect dignity, equality, and fraternity. Courts have repeatedly intervened to interpret existing laws and fill gaps where legislative clarity is lacking.

HATE SPEECH IN INDIA

Hate speech refers to speech, expression, or conduct that promotes hatred, discrimination, or hostility against individuals or groups based on identity markers such as religion, caste, ethnicity, gender, or language.

Such speech can appear in multiple forms including public speeches, written content, symbols, gestures, images, or online communication through social media platforms.

A key challenge in India is that hate speech is not explicitly defined in statutory law, creating ambiguity in enforcement. Instead, various provisions indirectly regulate such speech by focusing on public order and communal harmony.

LEGAL FRAMEWORK REGULATING HATE SPEECH

India regulates hate speech through a combination of constitutional provisions and statutory laws.

Article 19(2) of the Constitution allows the State to impose reasonable restrictions on free speech in the interests of public order, security of the State, and prevention of offences.

SEVERAL LAWS ADDRESS HATE SPEECH IN SPECIFIC CONTEXTS

- Representation of the People Act, 1951 – Sections 8, 123(3A), and 125 penalise communal appeals and hate speech during elections.
- Protection of Civil Rights Act, 1955 – prohibits speech that promotes untouchability or caste discrimination.
- **Bharatiya Nyaya Sanhita (BNS), 2023**
  - Section 196 (earlier IPC 153A) – penalises promoting enmity between groups.
  - Section 299 (earlier IPC 295A) – punishes deliberate acts outraging religious feelings.
  - Section 353 – penalises statements likely to incite offences or disturb public order.

SUPREME COURT JUDGEMENTS

The Supreme Court has played a crucial role in interpreting the limits of free speech.

- Pravasi Bhalai Sangathan v. Union of India – The Court declined to create a new offence but directed the Law Commission to recommend a clear definition of hate speech.

- Ramji Lal Modi v. State of Uttar Pradesh – Upheld restrictions on speech that threatens public order by insulting religious beliefs.
- Shreya Singhal v. Union of India (2015) – Struck down Section 66A of the IT Act, reaffirming that vague laws cannot suppress legitimate free speech.
- Tehseen Poonawalla v. Union of India (2018) – Directed governments to appoint nodal officers to prevent hate crimes and mob lynching, recognising the State's duty to protect citizens' dignity.

NEED FOR STRONGER CRIMINALISATION

The rise of online hate campaigns and communal mobilisation highlights the need for stronger regulation.

First, criminalisation helps protect vulnerable communities from discrimination and social exclusion. For instance, inflammatory online posts were found to have contributed to tensions during the 2020 Delhi riots.

Second, clear legal provisions can prevent violence and communal clashes by deterring provocative speech.

Third, stronger enforcement ensures accountability of both offenders and authorities, addressing gaps seen during elections or on social media platforms.

CONCLUSION

Hate speech threatens constitutional values of equality, fraternity, and dignity. While India possesses multiple legal safeguards, the absence of a clear statutory definition and inconsistent enforcement weaken their effectiveness. Strengthening legislation, improving enforcement mechanisms, and upholding judicial oversight will be crucial to maintaining democratic freedoms while safeguarding social harmony.

FRONT-OF-PACKAGE LABELLING: A PREVENTIVE STRATEGY TO ADDRESS INDIA'S RISING LIFESTYLE DISEASES

CONTEXT

The Supreme Court has urged the Food Safety and Standards Authority of India (FSSAI) to implement **Front-of-Package (FOP) labelling** to enable consumers to make healthier food choices. The Court has sought a time-bound response, highlighting concerns over regulatory delays despite earlier expert committee recommendations.

WHAT IS FRONT-OF-PACKAGE LABELLING?

Front-of-package labelling is a public health intervention that provides simplified and easily visible nutritional information on packaged foods. It highlights high levels of sugar, salt and saturated fat, enabling consumers to quickly assess the health risks of a product. Unlike detailed back-of-pack disclosures, FOP labels are designed to influence behavioural choices at the point of purchase, especially among populations with limited awareness or time.

NEED FOR FOP LABELLING IN INDIA

India faces a growing burden of non-communicable diseases (NCDs). The ICMR-INDIAB study (2023) estimates that India has over **101 million diabetics**, **136 million pre-diabetics**, and high prevalence of hypertension, obesity and hypercholesterolemia. Excessive consumption of processed foods rich in sugar, salt and unhealthy fats has emerged as a major risk factor.

FOP labelling can act as a behavioural nudge to promote healthier diets, improve nutritional literacy and support preventive healthcare. It aligns with Article 47 of the Constitution, which mandates the State to improve nutrition and public health.

IMPACT ON CONSUMERS AND PUBLIC HEALTH

Simplified warning labels empower consumers by enabling informed and quick decision-making. Evidence from countries such as Chile and Mexico shows reduced consumption of sugary beverages and greater awareness of nutritional risks. Over time, this could reduce disease prevalence, healthcare costs and productivity losses in India.

Further, it strengthens food system transparency and consumer rights, complementing initiatives such as **Eat Right India**.

IMPACT ON FOOD INDUSTRY

Mandatory labelling encourages product reformulation and innovation. Companies are incentivised to reduce sugar, salt and unhealthy fats to avoid negative labelling. This can improve overall nutritional quality in the market and foster healthier competition. However, industry stakeholders have expressed concerns about compliance costs and trade implications.

CHALLENGES IN IMPLEMENTATION

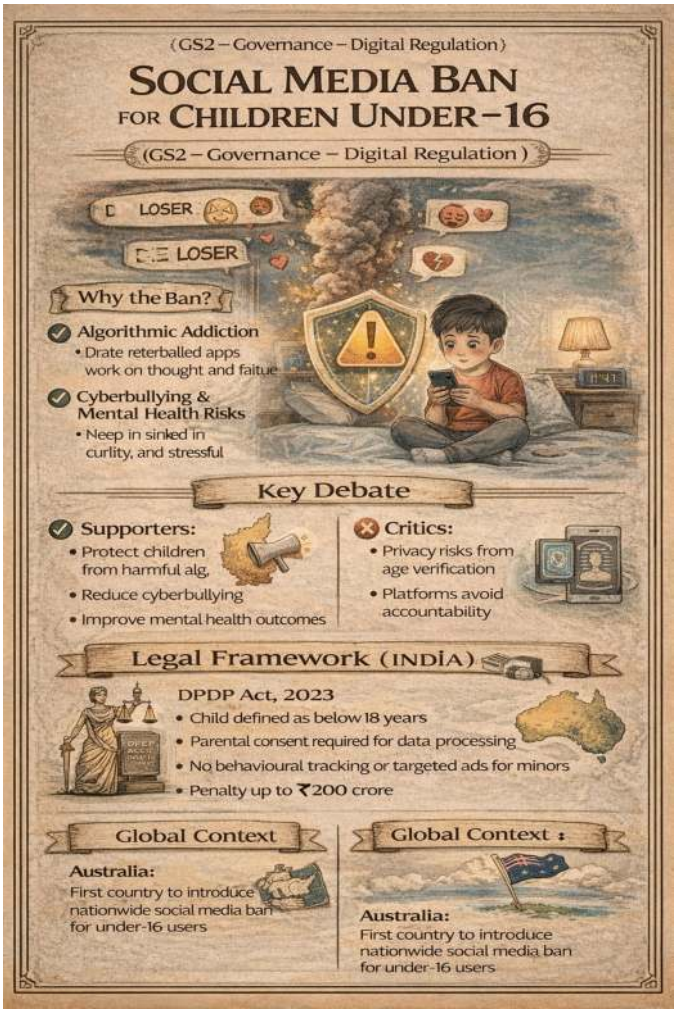
Key challenges include resistance from the food industry, the need for culturally sensitive and multilingual labels, and ensuring regulatory enforcement. India's diverse literacy levels and dietary patterns require Context-specific design. Public awareness campaigns and nutrition education are critical for effective adoption.

WAY FORWARD

India should adopt a phased and evidence-based FOP framework aligned with global best practices while addressing domestic socio-economic realities. Integration with digital platforms, school education, and community outreach can maximise impact. Strong monitoring and stakeholder engagement will ensure sustainability.

In conclusion, front-of-package labelling marks a shift towards preventive and participatory healthcare. By promoting informed consumer behaviour, corporate accountability and healthier food environments, it can play a transformative role in tackling India's nutrition transition and advancing long-term public health goals.

KARNATAKA ANNOUNCES BAN ON SOCIAL MEDIA FOR CHILDREN UNDER-16



CONTEXT

Karnataka has become the **first Indian state to announce a ban on social media use for children below 16 years of age**, citing concerns over mental health, online safety and algorithmic addiction. The proposal reflects growing global debates on regulating digital platforms for minors. Other states such as **Andhra Pradesh and Goa** are also considering similar restrictions.

However, the move raises a constitutional question because **Entry 31 of the Union List places telecommunications and the internet under the Union government's jurisdiction**, potentially limiting the legislative competence of states to impose such restrictions.

Globally, **Australia recently enacted the world's first nationwide law prohibiting social media access for children under 16**, signalling an emerging international trend toward stricter digital safety frameworks for minors.

RATIONALE FOR THE BAN

Supporters of the proposed ban highlight several concerns regarding children's exposure to social media platforms.

First, **algorithmic addiction** is seen as a major problem. Many platforms use infinite scrolling and personalised recommendation algorithms designed to maximise user engagement. These systems activate dopamine reward cycles in the brain, potentially leading to excessive usage, reduced attention spans, and behavioural dependency among adolescents.

Second, **cyberbullying and online harassment** have become serious issues. Anonymous digital environments enable harassment that can significantly affect children's mental health. Studies have linked cyberbullying with rising levels of **anxiety, depression, and self-harm among teenagers**.

Third, **sleep disruption and developmental impacts** are associated with late-night device usage. Prolonged screen exposure interferes with circadian rhythms and can lead to chronic sleep deprivation, which negatively affects cognitive development, academic performance and emotional stability.

CONCERNS AGAINST THE BAN

Critics argue that a blanket ban may produce unintended consequences.

One major concern is **privacy risk**. Enforcing age restrictions would require platforms to deploy age verification mechanisms such as biometric authentication or identity verification. This could result in the collection of sensitive personal data, raising concerns about surveillance and data misuse.

Another criticism is that bans may **shift responsibility away from social media companies**. Instead of reforming harmful algorithms or strengthening platform safety mechanisms, companies might simply comply with age restrictions while deeper structural problems remain unaddressed.

Additionally, a blanket restriction could worsen the **digital divide**. Many students rely on social media groups and platforms for peer learning, collaboration, and educational resources. A universal ban may disproportionately affect children from disadvantaged backgrounds who lack access to alternative learning tools.

EXISTING LEGAL FRAMEWORK

India already has legal provisions governing children's digital safety under the **Digital Personal Data Protection (DPDP) Act, 2023**.

The Act defines a **child as any person below 18 years of age** and requires **verifiable parental consent** before platforms can process children's personal data. It also prohibits **behavioural monitoring, tracking, and targeted advertising directed at minors**.

Non-compliance can attract **financial penalties of up to ₹200 crore**.

CONCLUSION

The Karnataka proposal highlights the growing challenge of balancing **child safety, digital freedom, privacy, and federal legislative authority**. Rather than relying solely on bans, experts suggest a **multi-layered regulatory approach combining algorithm transparency, platform accountability, digital literacy and parental oversight**.

SEVEN YEARS OF SWAYATT INITIATIVE: PROMOTING INCLUSIVE PUBLIC PROCUREMENT

CONTEXT

According to the **Press Information Bureau (PIB)**, the **Government e-Marketplace (GeM)** recently marked **seven years of the SWAYATT initiative**, underscoring its role in promoting **inclusive and equitable public procurement**. The initiative focuses on integrating **start-ups, women entrepreneurs, youth, and small enterprises** into government procurement processes.

ABOUT SWAYATT INITIATIVE

SWAYATT (Startups, Women and Youth Advantage Through e-Transactions) is a flagship initiative launched in **2019** by the **Ministry of Commerce and Industry (MoCI)**. It aims to **democratise public procurement** by enabling underrepresented sellers to access government markets through digital platforms.

Key Features

- **Nodal Agency**: Implemented through the **Government e-Marketplace (GeM)**.
- **Objective**: Improve access to **markets, finance, and value addition opportunities** for smaller and emerging businesses.
- **Target Beneficiaries**:
  - Start-ups
  - Women entrepreneurs
  - Youth-led enterprises
  - Micro and Small Enterprises (MSEs)
  - Self-Help Groups (SHGs)

SPECIAL DIGITAL STOREFRONTS

To enhance visibility for smaller sellers, GeM hosts dedicated sections such as:

- **Womaniya** – Promotes women-led enterprises and products.
- **Startup Runway** – Enables innovative start-ups to showcase new products and technologies to government buyers.

ABOUT GOVERNMENT E-MARKETPLACE (GEM)

The **Government e-Marketplace (GeM)** is India's **national online procurement portal** used by government departments, public sector undertakings (PSUs), and organisations to purchase goods and services.

- **Launch Year**: 2016
- **Purpose**: Replace the earlier **Directorate General of Supplies and Disposals (DGS&D)** procurement system.
- **Operator**: **GeM Special Purpose Vehicle (SPV)** under the Ministry of Commerce and Industry.
- **Digital Architecture**:
  - **Cashless**
  - **Paperless**
  - **Contactless** platform with minimal human interface.

REGULATORY MANDATE

- **Rule 149 of the General Financial Rules (GFR), 2017** mandates central ministries and departments to procure available goods and services through GeM.

TRANSPARENCY AND ACCESS

- **Bid Anonymity**: Seller identities remain hidden until bid opening to prevent collusion.
- **Open Registration**: Any legally registered business with **GST and PAN** can register and sell on GeM.

SIGNIFICANCE OF SWAYATT

- **Inclusive Growth**: Expands economic participation for marginalised entrepreneurs.
- **Digital Governance**: Uses digital platforms to reduce entry barriers in government procurement.
- **Women Empowerment**: Dedicated storefronts promote women-led enterprises.
- **Startup Ecosystem Support**: Enables start-ups to access government buyers and scale innovations.

By integrating smaller enterprises into the procurement ecosystem, SWAYATT strengthens India's push toward **transparent, inclusive, and technology-driven governance**.

DIVYANG SAHARA YOJANA AND DIVYANGJAN KAUSHAL YOJANA

CONTEXT

During a post-Budget webinar following the **Union Budget 2026–27**, the Prime Minister highlighted two new initiatives aimed at strengthening support for

persons with disabilities (*Divyangjan*): **Divyang Sahara Yojana** and **Divyangjan Kaushal Yojana**. Both schemes are introduced under the **Ministry of Social Justice and Empowerment (MoSJE)** to promote accessibility, dignity, and economic empowerment of persons with disabilities.

DIVYANG SAHARA YOJANA

The **Divyang Sahara Yojana** focuses on improving access to modern assistive technologies for Divyangjan so that they can live independently and participate actively in society.

Key Features

- **Affordable Assistive Devices:** The scheme aims to provide advanced assistive devices such as prosthetics, mobility aids, hearing devices, and other adaptive technologies at affordable prices.
- **Support to ALIMCO:** It will strengthen the capacity of the **Artificial Limbs Manufacturing Corporation of India (ALIMCO)** to expand manufacturing and adopt **AI-enabled and advanced technologies** for better assistive products.
- **Assistive Marts:** Retail-style centres will be established where beneficiaries can **see, test, and select suitable devices** based on their specific needs.
- **Service Hubs:** Existing **Pradhan Mantri Divyasha–Vayoshri Kendras (PMDVKs)** will be upgraded into service hubs to provide **assessment, customisation, repairs, and maintenance** of assistive devices.

Through these measures, the scheme aims to improve accessibility, mobility, and the quality of life of persons with disabilities.

DIVYANGJAN KAUSHAL YOJANA

The **Divyangjan Kaushal Yojana** aims to strengthen the employability of Divyangjan by providing **industry-relevant skill training** aligned with emerging sectors of the economy.

Key Features

- **Skill Development:** The scheme focuses on equipping Divyangjan with **job-oriented skills** to enable dignified livelihood opportunities.
- **Target Sectors:** Training will be provided in high-growth sectors such as **Information Technology (IT), Animation, Visual Effects, Gaming and Comics (AVGC), Hospitality, and Food & Beverage services**.
- **Digital Integration:** Skill training registration will be integrated with the **Department of Empowerment of Persons with Disabilities (DEPwD)** through the **PM-DAKSH Portal**, ensuring transparency and improved monitoring.
- **Industry Linkages:** The programme aims to connect trained candidates with employers, thereby promoting inclusive workforce participation.

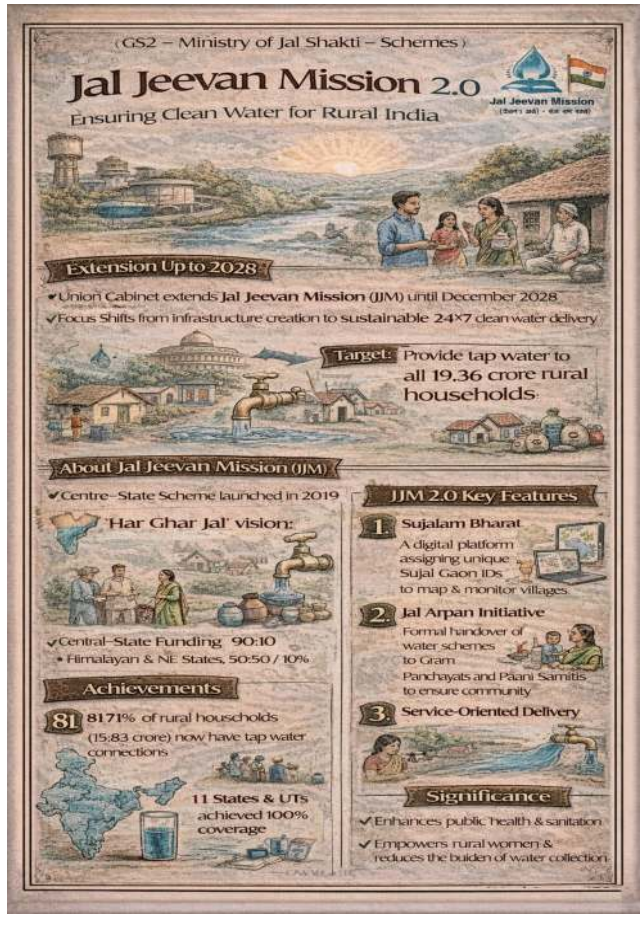
SIGNIFICANCE

Together, these two schemes represent a **holistic approach toward disability empowerment**:

- **Accessibility:** Provision of modern assistive devices improves independence and mobility.
- **Economic Empowerment:** Skill training enhances employability and financial independence.
- **Technology Integration:** Use of AI and digital platforms strengthens delivery and monitoring of welfare schemes.
- **Inclusive Development:** Aligns with the government's vision of **"Sabka Saath, Sabka Vikas, Sabka Vishwas."**

By combining technological support with skill development, these initiatives aim to ensure that Divyangjan can participate more fully in India's socio-economic growth.

JAL JEEVAN MISSION 2.0: ADVANCING RURAL WATER SECURITY IN INDIA



CONTEXT

The Union Cabinet has approved the **extension of the Jal Jeevan Mission (JJM) until December 2028**, allocating additional resources to achieve universal rural

drinking water coverage. The next phase, **JJM 2.0**, shifts the emphasis from merely building water infrastructure to ensuring **citizen-centric, reliable, and sustainable 24×7 drinking water services**.

ABOUT JAL JEEVAN MISSION (JJM)

The **Jal Jeevan Mission** is a **Centrally Sponsored Scheme launched in 2019** under the **Ministry of Jal Shakti**. Its primary objective is to provide **Functional Household Tap Connections (FHTCs)** to every rural household under the vision of **"Har Ghar Jal."**

The mission aims to ensure **safe and adequate drinking water supply of 55 litres per capita per day (lpcd)** of prescribed quality on a sustained basis.

The scheme follows a **Centre–State cost-sharing mechanism**:

- **90:10** for Himalayan and North-Eastern States and Union Territories with legislatures
- **50:50** for other States
- **100% Central funding** for Union Territories without legislatures

In addition to rural areas, **JJM–Urban**, announced in the **Union Budget 2021–22**, seeks to provide universal water supply in statutory towns under the Ministry of Housing and Urban Affairs.

KEY FEATURES OF JJM 2.0

The extended phase aims to strengthen sustainability, governance, and service delivery.

Universal Rural Coverage:

The mission aims to extend tap water connections to **all 19.36 crore rural households** across India.

Sujalam Bharat Digital Platform:

A new digital system will assign each village a **unique "Sujal Gaon/Service Area ID."** This will enable digital mapping and monitoring of rural drinking water infrastructure, improving transparency and maintenance.

Jal Arpan Initiative:

This initiative introduces a **formal handover mechanism** where completed water supply schemes are transferred to **Gram Panchayats and village water committees (Paani Samitis)**. The aim is to promote **community ownership, accountability, and long-term sustainability**.

Service-Oriented Approach:

Unlike the initial phase that focused on infrastructure creation, JJM 2.0 emphasises **continuous water service delivery, water quality monitoring, and sustainable source management.**

ACHIEVEMENTS OF JAL JEEVAN MISSION

Since its launch in 2019, the mission has made significant progress in expanding rural drinking water access.

- Approximately **81.71% of rural households (about 15.82 crore)** now have tap water connections.
- **11 States and Union Territories** have already achieved **100% rural tap water coverage**.
- The mission has also improved **water quality surveillance and community participation** through village-level water committees.

SIGNIFICANCE OF THE MISSION

Access to safe drinking water is essential for **public health, gender empowerment, and rural development**. Women and girls, who traditionally bear the burden of water collection, benefit significantly from household tap connections. The mission also supports **SDG-6 (Clean Water and Sanitation)** and strengthens India's climate resilience through improved water management.

CONCLUSION

The extension of **Jal Jeevan Mission to 2028** marks a shift from infrastructure creation to **sustainable water service delivery**. By integrating **digital monitoring, community participation, and universal access**, JJM 2.0 aims to ensure that every rural household receives reliable and safe drinking water, advancing the vision of **inclusive and sustainable development in India**.

NATIONAL LEPROSY ERADICATION PROGRAMME: INDIA'S PUSH TOWARDS "LEPROSY MUKT BHARAT"

CONTEXT

The **Ministry of Health and Family Welfare (MoHFW)** recently highlighted the progress of the **National Leprosy Eradication Programme (NLEP)** in reducing the burden of leprosy in India. The programme aims to eliminate leprosy completely and achieve the goal of **"Leprosy Mukt Bharat" by 2027**, three years ahead of the **UN Sustainable Development Goal (SDG) target of 2030**.

ABOUT THE NATIONAL LEPROSY ERADICATION PROGRAMME (NLEP)

NLEP is a **centrally sponsored health programme** implemented under the **National Health Mission (NHM)** to detect, treat and prevent leprosy.

- **Objective:** Early detection and complete treatment of leprosy cases to eliminate transmission.
- **Strategic Framework:** The **National Strategic Plan and Roadmap (2023–2027)** guides targeted elimination measures.
- **Current Status:** India eliminated leprosy as a **public health problem in 2005**, defined as prevalence below **1 case per 10,000 population**. The current prevalence is about **0.57 per 10,000 population**.
- **Integrated Approach:** Combines medical treatment, rehabilitation and awareness campaigns to address stigma and improve reporting.

KEY COMPONENTS OF NLEP

1. Active Case Detection and Surveillance

- The **Active Case Detection and Regular Surveillance (ACDRS)** initiative integrates previous screening programmes.
- Health workers conduct door-to-door surveys and community screening to identify hidden cases.

2. Standardised Treatment

- All diagnosed patients receive **free Multi-Drug Therapy (MDT)** through government health facilities.
- The MDT regimen includes **Rifampicin, Dapsone and Clofazimine**, which effectively cure the disease when taken regularly.
- India has declared **leprosy a notifiable disease**, and treatment protocols were revised in **2025** in line with **WHO guidelines**.

3. Disability Prevention and Medical Rehabilitation (DPMR)

- Focuses on preventing deformities caused by untreated leprosy.
- Services include **reconstructive surgery, physiotherapy and protective footwear**.
- Patients undergoing surgery receive a **₹12,000 welfare allowance** to support recovery.

4. Awareness and Stigma Reduction

- The **Sparsh Leprosy Awareness Campaign (SLAC)** is organised annually on **30 January (Anti-Leprosy Day)**.
- It promotes early reporting of symptoms and works to reduce social discrimination faced by patients.

5. Digital Monitoring and Surveillance

- The **Nikusth 2.0 digital platform** enables real-time reporting and tracking of leprosy patients across India.
- It improves data-driven decision-making and strengthens national disease surveillance.

SIGNIFICANCE OF NLEP

- **Early Diagnosis:** Prevents disability and reduces transmission through timely treatment.
- **Universal Treatment Access:** Free MDT ensures equitable healthcare access.
- **Community Awareness:** Reduces stigma and encourages reporting of cases.
- **Digital Monitoring:** Improves programme efficiency and accountability.

WAY FORWARD

Despite significant progress, India still accounts for a large share of global leprosy cases. Strengthening **community-based detection, awareness campaigns, and digital monitoring systems** will be crucial to achieving the **2027 elimination target** and ensuring sustained progress towards a **leprosy-free India**.

REMOVAL PROCESS OF THE CHIEF ELECTION COMMISSIONER (CEC)

CONTEXT

According to recent reports, opposition parties are considering initiating a removal motion against **Gyanesh Kumar**, the current **Chief Election Commissioner (CEC)**.

This would be the **first removal motion against a CEC appointed under the Chief Election Commissioner and Other Election Commissioners Act, 2023**.

The Act ensures **legal continuity**, as **Section 11(2)** states that the **grounds and procedure for removal remain identical to those under Article 324(5) of the Constitution**.

CONSTITUTIONAL BASIS

The **Election Commission of India** derives its authority from **Article 324 of the Constitution of India**.

Under **Article 324(5)**:

- The **Chief Election Commissioner can be removed in the same manner and on the same grounds as a Judge of the Supreme Court**.
- This provision ensures **institutional independence** and protects the office from arbitrary removal.

GROUNDS FOR REMOVAL

A CEC may be removed only on two grounds:

- **Proven Misbehaviour**
- **Incapacity**

These grounds are similar to those applied in the **impeachment process of a Supreme Court judge**.

PROCEDURE FOR REMOVAL

1. Initiation of Motion

A removal motion may be introduced in **either House of Parliament**.

Minimum support required:

- **100 Members of Lok Sabha**, or
- **50 Members of Rajya Sabha**

2. Admission by Presiding Officer

The **Speaker of Lok Sabha** or the **Chairman of Rajya Sabha** examines whether the motion satisfies the required conditions.

They may **admit or reject the motion**.

3. Constitution of Inquiry Committee

If admitted, a **three-member inquiry committee** is formed consisting of:

1. The **Chief Justice of India or a Supreme Court Judge**,
2. The **Chief Justice of a High Court**, and
3. A **distinguished jurist**.

4. Investigation

The committee:

- Frames the charges
- Conducts a detailed investigation
- Submits its findings to the presiding officer.

The motion **does not lapse** even if Parliament is prorogued or the Lok Sabha is dissolved during the inquiry.

5. Special Majority in Parliament

If the committee finds the CEC guilty, **both Houses of Parliament must pass the removal motion** with a **special majority**:

- Majority of the **total membership** of the House, AND
- **Two-thirds of members present and voting**

Both Houses must pass the resolution **in the same parliamentary session**.

6. Presidential Order

After parliamentary approval, an **address is presented to the President of India**, who formally orders the removal of the CEC.

IMPORTANT NOTE

No **Chief Election Commissioner of India has ever been removed from office** so far.

However, **other Election Commissioners and Regional Commissioners can be removed by the President on the recommendation of the CEC**, without requiring parliamentary approval.

SUPREME COURT APPLIES PASSIVE EUTHANASIA FRAMEWORK

CONTEXT

The **Supreme Court of India** recently permitted the withdrawal of life-sustaining treatment for **Harish Rana**, who had remained in a **persistent vegetative state for 13 years**.

This marks the **first instance where the Court has practically applied the passive euthanasia framework** laid down in the landmark judgment of **Common Cause v. Union of India**.

WHAT IS EUTHANASIA?

Euthanasia refers to the **intentional ending of a person's life to relieve suffering** caused by incurable illness or severe pain. It is usually carried out under **medical supervision** to ensure dignity at the end of life.

TYPES OF EUTHANASIA

1. Active Euthanasia

- Involves **deliberate action to cause death**, such as administering a lethal injection.
- **Illegal in India** and punishable under criminal law.

2. Passive Euthanasia

- Involves **withdrawing or withholding life-sustaining treatment** such as ventilators, artificial nutrition, or medication.
- **Permitted in India under strict safeguards** as per Supreme Court guidelines.

LEGAL FRAMEWORK OF PASSIVE EUTHANASIA IN INDIA

Constitutional Basis

The legal framework is grounded in **Article 21 of the Constitution of India**, which guarantees the **right to live with dignity**. The Court interpreted this to include the **right to die with dignity** in certain circumstances.

Living Will

Individuals may create a **living will (advance directive)** stating that life-support treatment should not be continued if they become terminally ill or enter a vegetative state.

MEDICAL BOARDS

Withdrawal of treatment requires approval from:

- **Primary Medical Board** of the treating hospital
- **Secondary Medical Board** consisting of independent doctors

These boards evaluate the patient's condition and confirm that recovery is unlikely.

JUDICIAL OVERSIGHT

The decision must be **communicated to a Judicial Magistrate**, ensuring transparency and preventing misuse.

Applicability

Passive euthanasia is allowed only for:

- **Terminally ill patients**, or
- Patients in a **persistent vegetative state with no reasonable chance of recovery**.

EVOLUTION OF SUPREME COURT GUIDELINES

Aruna Shanbaug v. Union of India

- First recognised passive euthanasia as legally permissible in India, though the request in Shanbaug's case was rejected.

Common Cause v. Union of India (2018)

- Recognised **passive euthanasia and living wills**.
- Declared the **right to die with dignity as part of Article 21**.

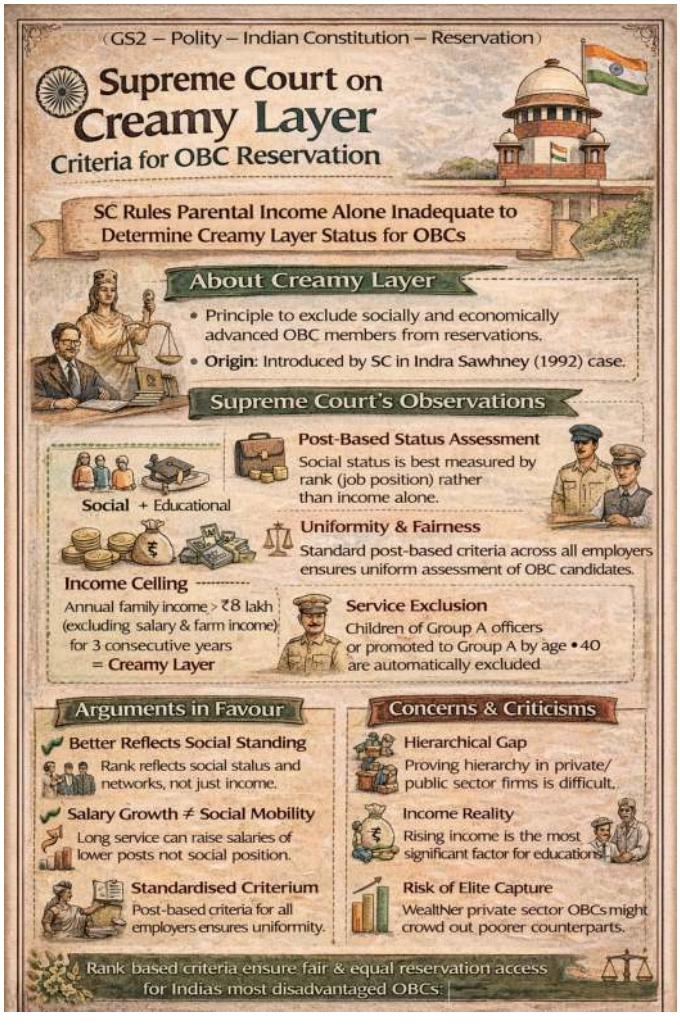
SUPREME COURT GUIDELINES MODIFICATION (2023)

- Simplified procedures for executing living wills.
- Introduced **clear timelines for medical boards**.
- Reduced the procedural burden involving magistrates to make the process more practical.

SIGNIFICANCE

The recent application of the passive euthanasia framework demonstrates the **operationalisation of the right to die with dignity** while ensuring safeguards against misuse. It reflects the judiciary's effort to balance **individual autonomy, medical ethics, and legal accountability** in end-of-life decisions.

SUPREME COURT CLARIFIES CREAMY LAYER CRITERIA FOR OBC RESERVATION



CONTEXT

The **Supreme Court of India** recently ruled that **parental income alone cannot be the sole criterion** for determining the **creamy layer status of Other Backward Classes (OBCs)**. The Court emphasised that for parents working in **Public Sector Undertakings (PSUs) or the private sector**, the **nature or category of the post (Group A, B, C, or D equivalent)** must also be considered.

The judgment addresses an existing anomaly where **children of government employees are evaluated based on rank**, while **children of PSU or private-sector employees are assessed solely on the basis of income**.

CREAMY LAYER IN OBC RESERVATION

The **creamy layer principle** aims to exclude the socially and economically advanced members of OBC communities from reservation benefits.

Origin:

The concept was introduced by the Supreme Court in **Indra Sawhney v. Union of India (1992)** to ensure reservation benefits reach the **most socially disadvantaged groups**.

Determining Factors

- Social status
- Educational advancement
- Economic position

Income Threshold

- Families earning **more than ₹8 lakh annually for three consecutive years** fall under the creamy layer.
- **Salary and agricultural income are excluded**; only income from **business, profession, property, or investments** is counted.

Service Exclusion Rule

- Children of parents holding **Group A/Class I posts**, or promoted to **Group A before the age of 40**, are automatically excluded from reservation benefits.

KEY OBSERVATIONS OF THE SUPREME COURT

Post-Based Evaluation

The Court held that **social status is better reflected by occupational rank than by income alone**.

Equality Principle

Different criteria for government and PSU/private-sector employees violate **Articles 14, 15, and 16**, which guarantee **equality before law and equal opportunity in public employment**.

Uniform Criteria

The Court emphasised the need for **a consistent standard for identifying creamy layer status across all employment sectors**.

ARGUMENTS IN FAVOUR OF THE RULING

Better Indicator of Social Status

Rank or position often reflects **social standing and access to networks**, which income alone may not capture.

Salary Growth vs Social Mobilty

A lower-rank employee may earn a higher salary after years of service without experiencing a corresponding **rise in social status**.

Uniformity in Assessment

Applying **post-based criteria uniformly across government, PSU, and private sectors** ensures fair evaluation of OBC candidates.

CONCERNS AND CRITICISMS

Private Sector Classification Issues

Unlike the government, the **private sector lacks a standardised hierarchy**, making post-based classification difficult.

Income as a Real Determinant

Critics argue that **income significantly affects access to education and opportunities**, and ignoring it may distort eligibility.

Risk of Elite Capture

High-income families working in the private sector could still qualify under reservations, potentially **reducing opportunities for poorer OBC candidates**.

SIGNIFICANCE OF THE JUDGMENT

The ruling highlights the judiciary's effort to ensure that **reservation policies remain socially just and constitutionally consistent**. By emphasising **uniform criteria and equality before law**, the decision attempts to refine the creamy layer principle so that **affirmative action continues to benefit the most disadvantaged sections of society**.

INTERNATIONAL RELATIONS

GS PAPER 2

INDIA–FRANCE "SPECIAL GLOBAL STRATEGIC PARTNERSHIP": A NEW INDO-PACIFIC ANCHOR

CONTEXT

French President **Emmanuel Macron** is on a three-day official visit to India in 2026, marking his **fourth visit**. During the visit, India and France formally upgraded their ties to a **Special Global Strategic Partnership**, reinforcing cooperation in defence, technology, economy, and Indo-Pacific stability.

This elevation builds upon the **Horizon 2047 Roadmap (2023)**, which focuses on **Security, Planet, and People**.

KEY OUTCOMES OF MACRON'S 2026 VISIT

1. Diplomatic & Institutional Strengthening

- The partnership was elevated to a **Special Global Strategic Partnership** to deepen Indo-Pacific coordination.
- An **Annual Foreign Ministers Dialogue** was institutionalised to monitor implementation of **Horizon 2047** goals.

2. Defence and Military Cooperation

- A **BEL–Safran Joint Venture** was launched to localise **HAMMER missile** manufacturing in India.
- **Reciprocal liaison officers** were deployed between Indian Army and French Land Forces establishments to improve interoperability.

3. Technology and Innovation Collaboration

- The **Indo-French Centre for Digital Sciences** was launched to co-develop trusted digital public infrastructure and emerging technologies.
- **India-France Year of Innovation 2026** was launched to promote R&D cooperation among startups and research institutions.

4. Skilling and Human Capital

- A Letter of Intent was signed to establish a **National Centre of Excellence for Skilling in Aeronautics**.
- France operationalised a **five-year Schengen visa** for Indian Master's alumni, easing professional mobility.

5. Healthcare and Logistics

- AIIMS Delhi will host an **Indo-French Centre for AI in Health**, focusing on advanced diagnostics.
- India Post and **La Poste (France)** signed an LoI to modernise **e-commerce logistics and digital postal services**.

6. Economic and Tax Alignment

- A protocol was signed to amend the **Double Taxation Avoidance Agreement (DTAA)**, facilitating cross-border investments.

OVERVIEW OF INDIA–FRANCE BILATERAL RELATIONS

- India's first strategic partnership (1998) was with France, upgraded further in **2026**.
- Bilateral trade reached **$15 billion (2024–25)**, with India maintaining a trade surplus.
- France remains among India's top defence partners:
  - procurement plans include **114 Rafale jets** and a confirmed deal for **26 Rafale-M jets**.

- Regular military exercises: **Varuna, Shakti, Garuda**.
- Digital cooperation expanded with **UPI integration in France**, including landmark usage at Eiffel Tower locations.
- Space ties: ISRO–CNES cooperation includes **TRISHNA satellite** for climate monitoring.
- Nuclear cooperation: Civil Nuclear Agreement (2008) and the **Jaitapur Nuclear Power Project (9.9 GW)**.

STRATEGIC SIGNIFICANCE

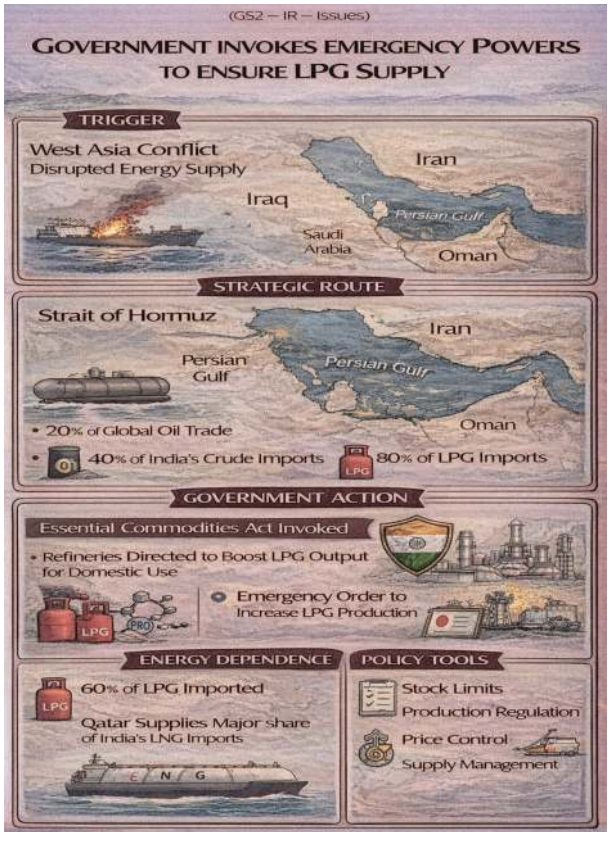
The upgraded partnership strengthens India's global positioning by supporting:

- strategic autonomy,
- multipolar world order,
- Indo-Pacific security,
- defence indigenisation and advanced technology collaboration.

CONCLUSION

India–France ties are emerging as a core pillar of India's Indo-Pacific and strategic diplomacy, combining defence manufacturing, digital trust frameworks, innovation, and global governance coordination.

INDIA INVOKES EMERGENCY POWERS TO SECURE LPG SUPPLY AMID WEST ASIA TENSIONS



CONTEXT

Amid geopolitical tensions in **West Asia** disrupting global energy supply chains, the Government of India has invoked emergency powers to ensure adequate availability of **Liquefied Petroleum Gas (LPG)** for domestic consumption. The Ministry of Petroleum and Natural Gas directed oil refineries to **increase LPG production and divert additional output for household use**, reflecting concerns over supply disruptions and rising fuel prices.

IMPACT OF WEST ASIA CONFLICT ON ENERGY SUPPLY

India's energy security is closely tied to West Asian shipping routes.

- **Strategic Energy Route**: The **Strait of Hormuz**, located between Iran and Oman, connects the Persian Gulf to the Arabian Sea. Nearly **20% of global oil trade** passes through this narrow waterway.
- **India's Dependence**: Around **40% of India's crude oil imports and over 80% of its LPG imports** transit through this strait.
- **Price Volatility**: Global crude oil prices have risen by about **$20 per barrel (~30%)**, raising concerns about inflation and higher import bills.
- **LNG Supply Risk**: Qatar supplies nearly **half of India's LNG imports**, making disruptions in the region a major concern for India's energy supply.

EMERGENCY ORDER UNDER THE ESSENTIAL COMMODITIES ACT

To manage the situation, the government invoked provisions under the **Essential Commodities Act, 1955**.

- The Ministry issued directives under the **Petroleum Products (Maintenance of Production, Storage and Supply) Order, 1999**.
- Oil refineries were instructed to **maximise LPG output** from available **propane and butane streams**.
- The extra LPG production is to be **prioritised for domestic consumption** to prevent shortages.

This step aims to stabilise supply and protect consumers from potential disruptions.

ABOUT LIQUEFIED PETROLEUM GAS (LPG)

- LPG mainly consists of **propane and butane**, with small amounts of other hydrocarbons.
- It is produced during **crude oil refining and natural gas processing**.
- India's LPG usage has expanded significantly through the **Pradhan Mantri Ujjwala Yojana (PMUY)**, which increased LPG coverage from **about 62% of households in 2016 to nearly universal access today**.
- Around **60% of India's LPG demand is met through imports**, mainly from **Saudi Arabia and Qatar**.

ABOUT LIQUEFIED NATURAL GAS (LNG)

- LNG is **natural gas (primarily methane)** cooled to about **–160°C** to convert it into liquid form for easier transport.
- It is shipped via specialised LNG carrier vessels and later **regasified at terminals** before entering pipeline networks.
- India produces roughly **50% of its natural gas domestically**, while the remaining **50% is imported**, largely from **Qatar**.

ESSENTIAL COMMODITIES ACT, 1955

The Act empowers the government to ensure the availability of essential goods at fair prices.

- **Objective**: Prevent hoarding, black marketing, and profiteering during shortages.
- **Government Powers**: Regulate production, supply, distribution, storage, and pricing of essential commodities.
- **Control Tools**: Stock limits, licensing, price control, and movement restrictions.
- **2020 Amendment**: Certain agricultural commodities were deregulated except under extraordinary conditions such as war, famine, or severe price rise.

CONCLUSION

India's emergency intervention highlights the vulnerability of energy supply chains to geopolitical disruptions. Strengthening domestic production, diversifying import sources, and improving strategic reserves remain essential for long-term energy security.

INDIA–EFTA TEPA COMPLETES TWO YEARS SINCE SIGNING

CONTEXT

The **India–EFTA Trade and Economic Partnership Agreement (TEPA)** has completed **two years since its signing**, marking an important milestone in India's trade diplomacy. The agreement came into force on **1 October 2025** after all participating countries completed the ratification process.

The agreement is between India and the **European Free Trade Association**, an intergovernmental organisation comprising four non-European Union countries:

- **Switzerland**
- **Norway**
- **Iceland**
- **Liechtenstein**

The TEPA is India's **first comprehensive trade agreement with a European trading bloc**, strengthening economic cooperation and investment flows.

KEY PROVISIONS OF INDIA–EFTA TEPA

1. Foreign Direct Investment (FDI) Commitment

EFTA countries have committed to a **binding investment of $100 billion in India over 15 years**, expected to generate **around one million direct jobs**.

2. Tariff Liberalisation

- Tariffs will be eliminated on **92.2% of product categories**.
- This covers **99.6% of India's exports to EFTA markets**, improving market access for Indian goods.

3. India's Tariff Concessions

India will reduce import duties on **82.7% of its tariff lines**, while **sensitive sectors such as dairy, soybeans, and coal are excluded** to protect domestic industries.

4. Services and Professional Mobility

The agreement provides for **Mutual Recognition Agreements (MRAs)**, enabling Indian professionals such as **nurses, accountants, engineers, and other service providers** to work more easily in EFTA countries.

5. Safeguard Mechanism

India retains the right to **withdraw tariff concessions** if EFTA countries fail to meet the promised **$100 billion investment commitment**.

EARLY OUTCOMES OF THE AGREEMENT

Investment Initiatives

- **Iceland** has announced an initial **$30 million investment in India's fisheries sector**, signalling early investment momentum.

Investment Facilitation

- The **India–EFTA Desk** has been established as a **single-window platform** to assist and facilitate EFTA investments in India.

Improved Export Value

- Indian agricultural exports have witnessed **higher price realisation**, indicating improved market value for Indian products in global markets.

SIGNIFICANCE

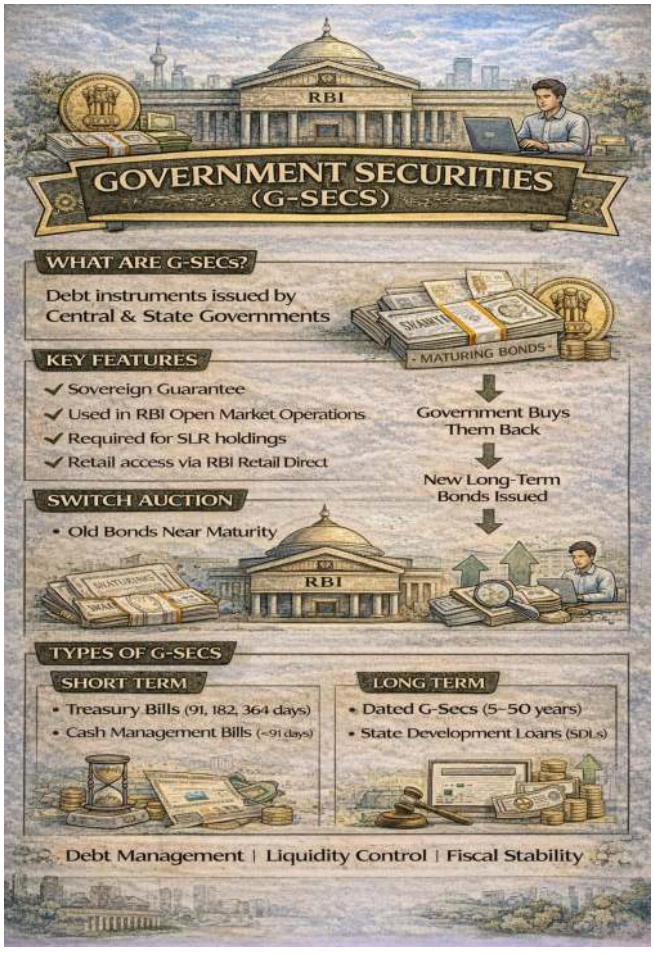
The India–EFTA TEPA reflects India's strategy of **expanding trade partnerships beyond traditional markets** and integrating more deeply into global value chains. The agreement promotes **investment inflows, employment generation, and improved access for Indian goods and services** in developed European markets.

It also signals India's growing role in **global trade negotiations and economic diplomacy**, while maintaining safeguards for sensitive domestic sectors.

ECONOMY

GS PAPER 3

GOVERNMENT BUYS BACK G-SECS THROUGH RBI'S SWITCH AUCTION



CONTEXT

According to *Business Standard*, the **Government of India recently bought back Government Securities (G-Secs)** through a **switch auction conducted by the Reserve Bank of India (RBI)**. The move aims to **ease redemption pressures on upcoming debt maturities** and improve the government's overall debt management strategy.

WHAT IS A SWITCH AUCTION?

A **Switch Auction** is a **debt management tool used by the RBI on behalf of the Government of India**. Under this mechanism:

- The government **repurchases bonds that are close to maturity**.
- In exchange, it **issues new long-term bonds** to investors.

This process helps **spread repayment obligations over a longer time horizon**, thereby reducing short-term redemption pressure on government finances.

ABOUT GOVERNMENT SECURITIES (G-SECS)

Government Securities (G-Secs) are **tradable debt instruments issued by the Central or State Governments** to finance public expenditure and fiscal deficits.

Key Features

- **Sovereign Guarantee:** G-Secs are often called **"gilt-edged securities"** because they carry **very low default risk**, backed by the government.
- **Liquidity Management Tool:** The **RBI uses G-Secs in Open Market Operations (OMOs)**:
  - **Buying G-Secs** injects liquidity into the banking system.
  - **Selling G-Secs** absorbs excess liquidity.
- **Role in Banking Regulation:** Commercial banks must maintain a portion of their deposits in **G-Secs to meet the Statutory Liquidity Ratio (SLR)** requirement.
- **Retail Participation:** Through the **RBI Retail Direct Scheme (2021)**, individual investors can directly purchase G-Secs via **Retail Direct Gilt (RDG) accounts**.

CLASSIFICATION OF GOVERNMENT SECURITIES

1. Short-Term Securities

These instruments generally **do not pay periodic interest** and are issued at a **discount to face value**.

- **Treasury Bills (T-Bills):** Issued by the Central Government with maturities of **91 days, 182 days, and 364 days**.
- **Cash Management Bills (CMBs):** Introduced in **2010** to manage **temporary cash mismatches**, with maturities **less than 91 days**.

2. Long-Term Securities

These securities have longer tenors and usually **pay periodic coupon interest**.

- **Dated Government Securities:** Issued by the Central Government with maturities ranging from **5 to 50 years**, typically paying **semi-annual interest**.
- **State Development Loans (SDLs):** Issued by **State Governments** to raise funds from the market for developmental expenditure.

SIGNIFICANCE OF THE SWITCH AUCTION

- **Debt Management Efficiency**: Helps manage large upcoming debt repayments.
- **Market Stability**: Prevents sudden liquidity stress in bond markets.
- **Fiscal Flexibility**: Spreads liabilities over longer maturities, improving fiscal planning.

Thus, switch auctions represent an important tool in **India's public debt management strategy**, helping maintain stability in both **government finances and financial markets**.

FDI POLICY REFORM FOR INVESTMENTS FROM LAND-BORDERING COUNTRIES

CONTEXT

According to *Doordarshan News* and *All India Radio*, the **Union Cabinet has approved amendments to the Foreign Direct Investment (FDI) policy** governing investments from countries sharing **land borders with India (LBCs)**. This reform revisits the stricter rules introduced in **April 2020**, which were designed to prevent **opportunistic takeovers of Indian companies during the COVID-19 pandemic**.

The policy primarily affects investments originating from **China, Pakistan, Bangladesh, Nepal, Myanmar, Bhutan, and Afghanistan**.

BACKGROUND: 2020 FDI POLICY AMENDMENT

In April 2020, India mandated that **any FDI from land-bordering countries must obtain prior government approval**, regardless of the sector. The step aimed to protect vulnerable Indian companies from **hostile acquisitions during economic disruptions**.

KEY CHANGES IN THE REVISED FDI POLICY

1. Clear Definition of Beneficial Ownership

- The term **"Beneficial Owner"** is now defined based on the **Prevention of Money Laundering (Maintenance of Records) Rules, 2005**.
- This enhances **transparency in investment ownership structures**.

2. Automatic Route for Limited Investments

- Investments from land-bordering countries with **non-controlling beneficial ownership up to 10%** are now permitted under the **automatic route**, subject to sectoral caps.

3. Mandatory Disclosure

- Companies receiving such investments must **report ownership details to the Department for Promotion of Industry and Internal Trade (DPIIT)**.

4. Time-bound Government Approval

- Investment proposals requiring government clearance will now be processed within a **maximum timeline of 60 days**, improving predictability.

5. Fast-track in Strategic Sectors

Priority approvals will be given in sectors such as:

- **Capital goods manufacturing**
- **Electronic capital goods and components**
- **Polysilicon and ingot-wafer production** (important for solar supply chains)

6. Safeguard through Indian Control

- **Majority ownership and control must remain with resident Indian citizens or Indian-owned entities**, protecting strategic interests.

EXPECTED BENEFITS OF THE POLICY REFORM

- **Boost to FDI Inflows:** Encourages investments from **global funds and venture capital**, especially in startups and high-tech sectors.

- **Strengthening Domestic Manufacturing:** Supports sectors such as **electronics, capital goods, and renewable energy**.
- **Technology Transfer and Innovation:** Joint ventures with foreign firms will enable **advanced technological capabilities**.
- **Support for National Economic Goals:** Higher investments align with **Atmanirbhar Bharat** and India's strategy to strengthen industrial capacity and global competitiveness.

WHAT IS FOREIGN DIRECT INVESTMENT (FDI)?

FDI refers to **investment made by a foreign entity in a business or assets in another country with the intention of establishing a lasting interest or management control**.

Common forms include:

- Setting up **subsidiaries**
- **Acquiring equity shares** in domestic firms
- Establishing **joint ventures** in sectors such as manufacturing, infrastructure, and services.

INDIA'S AGRICULTURAL AND PROCESSED FOOD EXPORT SURGE

CONTEXT

During **AAHAR 2026**, the Union Minister of Commerce & Industry highlighted the rapid growth in India's **agricultural and processed food exports**. The development reflects India's expanding presence in global food markets and the government's focus on promoting value-added agricultural products.

ABOUT AAHAR

AAHAR is a premier **Business-to-Business (B2B) international exhibition** for the food and hospitality sector held annually in **New Delhi**.

Organisers

- India Trade Promotion Organisation
- Agricultural and Processed Food Products Export Development Authority
- Ministry of Food Processing Industries

Role and Significance

- Promotes **"Brand India"** in global food markets.
- Showcases **GI-tagged agricultural products** such as basmati rice and regional fruits.
- Highlights indigenous **superfoods like millets (Shree Anna)**, strengthening culinary diplomacy and export promotion.

INDIA'S AGRI-FOOD EXPORT PERFORMANCE

India has witnessed significant expansion in agricultural and food exports in the past decade.

Global Position

- India has become the **7th largest exporter of agricultural produce globally**.

Export Value

- India's **agricultural and food exports are valued at nearly ₹5 lakh crore (around $55 billion) annually**.

Growth in Processed Foods

- Exports of processed food products have **quadrupled between 2014 and 2025**, now accounting for **over 20% of total agricultural exports**.

Sectoral Trends

- **Rice exports** increased by about **62%**.
- **Fruit and pulse exports** have **tripled**.
- **Cereal exports** have **doubled** between 2014 and 2025.

Commodity Leaders

- **Rice** accounts for **over 20% of India's agricultural exports**.
- **Marine products** and **meat and dairy products** are emerging as major export segments.

KEY DRIVERS OF EXPORT GROWTH

Expansion of Free Trade Agreements

India has concluded **nine Free Trade Agreements (FTAs)** in the last **3.5 years**, improving access to **38 developed economies**.

Market Diversification

India has expanded exports into **new markets such as Japan, South Korea, Vietnam, and countries of the European Free Trade Association (EFTA)**.

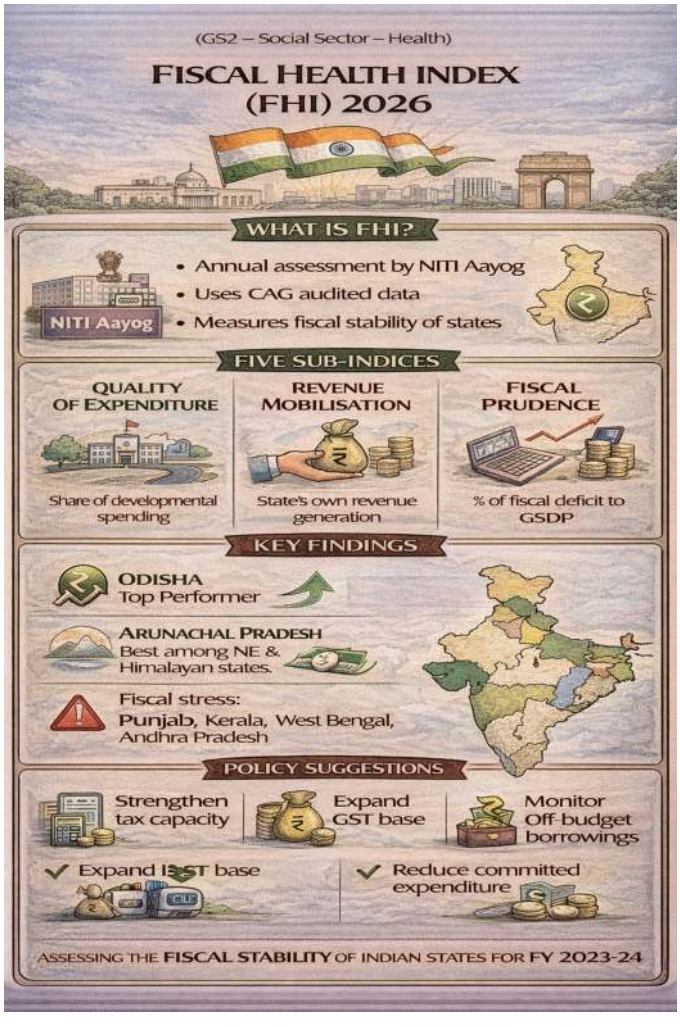
Quality and Certification

Better compliance with international standards, supported by certification and monitoring mechanisms, has improved the global acceptance of Indian food products. Institutions such as **Marine Products Export Development Authority** play a key role in this process.

SIGNIFICANCE

The surge in agri-food exports strengthens **farmer incomes, rural employment, and India's global trade footprint**. It also aligns with the broader strategy of promoting **value-added agricultural exports**, diversifying markets, and positioning India as a **reliable supplier in the global food supply chain**.

FISCAL HEALTH INDEX 2026: ASSESSING THE FINANCIAL STABILITY OF INDIAN STATES



CONTEXT

The **NITI Aayog** released the **Fiscal Health Index (FHI) 2026**, which evaluates the fiscal performance of Indian states for the financial year **2023–24**. The index aims to provide a comprehensive assessment of the financial stability of states and to identify structural fiscal challenges affecting long-term development.

ABOUT FISCAL HEALTH INDEX (FHI)

The **Fiscal Health Index** is an annual analytical tool developed by **NITI Aayog** to benchmark and compare the fiscal performance of states. It is based on **audited financial data from the Comptroller and Auditor General of India (CAG)**.

Objective:

To identify fiscal strengths and vulnerabilities across states and guide **evidence-based policymaking for sustainable economic growth and fiscal discipline**.

KEY PARAMETERS OF THE FISCAL HEALTH INDEX

The FHI evaluates states across **five sub-indices**:

1. **Quality of Expenditure:** Assesses the share of **developmental expenditure** (education, health, infrastructure) relative to non-developmental spending such as salaries, pensions, and interest payments.
2. **Revenue Mobilisation:** Measures the ability of states to **generate their own tax and non-tax revenues**, indicating fiscal independence.
3. **Fiscal Prudence:** Evaluates the size of **fiscal deficit and revenue deficit relative to Gross State Domestic Product (GSDP)**.
4. **Debt Index:** Examines the **size, structure and interest burden** of a state's outstanding public debt.
5. **Debt Sustainability:** Assesses whether **economic growth (GSDP growth)** is sufficient to service debt obligations, indicating long-term fiscal sustainability.

KEY HIGHLIGHTS OF FHI 2026

Expanded Coverage

For the first time, the index separately evaluated **10 North-Eastern and Himalayan states**, alongside **18 major states**.

Top Performer

Odisha retained the **top position among major states** for the second consecutive year due to strong revenue mobilisation, prudent fiscal management, and sustainable debt levels.

States Facing Fiscal Stress

States such as **Punjab, Kerala, West Bengal and Andhra Pradesh** continue to face fiscal challenges due to **high deficits, growing debt and large committed expenditures** (salaries, pensions and subsidies).

North-Eastern and Himalayan Category

Arunachal Pradesh emerged as the leading performer in this category owing to better expenditure quality and effective debt management.

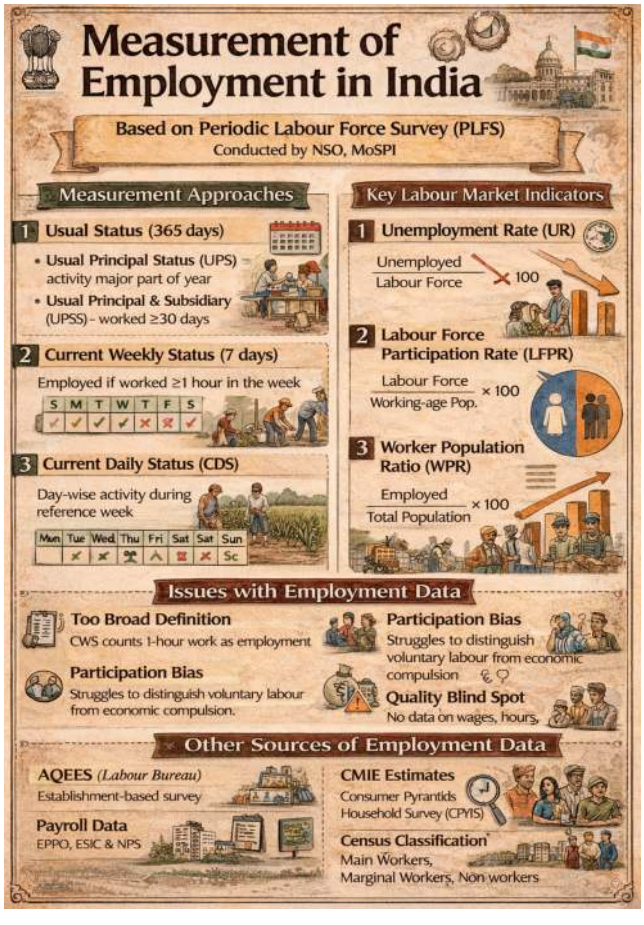
POLICY RECOMMENDATIONS BY NITI AAYOG

- **Strengthen State Tax Capacity:** Improve tax administration and broaden the GST base.
- **Rationalise Committed Expenditure:** Reduce excessive spending on salaries, pensions, and subsidies.
- **Monitor Off-Budget Borrowings:** Increase transparency in fiscal accounts.
- **Adopt Medium-Term Fiscal Frameworks:** Encourage long-term fiscal planning to ensure debt sustainability.

SIGNIFICANCE

The **Fiscal Health Index** serves as an important policy instrument to encourage **competitive fiscal discipline among states**, improve transparency in public finances, and support sustainable economic growth.

MEASURING EMPLOYMENT IN INDIA: METHODS, INDICATORS AND CHALLENGES



CONTEXT

The announcement of a **new GDP series** has revived debates on the **accuracy and methodology of employment measurement in India**, particularly regarding data generated by the **Periodic Labour Force Survey (PLFS)**.

Employment statistics are critical for evaluating **economic growth, labour-market conditions, and policy effectiveness**, making reliable measurement essential for evidence-based policymaking.

EMPLOYMENT MEASUREMENT FRAMEWORK IN INDIA

India primarily measures employment through the **Periodic Labour Force Survey (PLFS)** conducted by the **National Statistics Office (NSO)** under the **Ministry of Statistics and Programme Implementation (MoSPI)**.

PLFS was launched in **2017** to provide **annual and quarterly estimates of employment and unemployment**, replacing the earlier quinquennial National Sample Survey (NSS) employment surveys.

MEASUREMENT APPROACHES IN PLFS

PLFS uses **three activity-status approaches**, each based on a different reference period.

1. Usual Status (US)

Measures **long-term employment conditions** based on activity during the **preceding 365 days**.

- **Usual Principal Status (UPS):** Classifies individuals based on the activity occupying the **major part of the year**.
- **Usual Principal and Subsidiary Status (UPSS):** Counts individuals as employed if they **worked at least 30 days during the year**, capturing part-time or seasonal work.

2. Current Weekly Status (CWS)

Measures **short-term or seasonal employment** using a **7-day reference period**.

- A person is considered **employed if they worked for at least one hour on any day during the week**.

3. Current Daily Status (CDS)

Provides a **day-wise measure of labour activity** during the reference week.

- Captures **partial employment and underemployment** by recording the activity status **for each day** of the week.

KEY LABOUR MARKET INDICATORS

PLFS data is used to derive three major labour-market ratios:

1. Unemployment Rate (UR)

Percentage of unemployed persons within the **total labour force**.

2. Labour Force Participation Rate (LFPR)

Proportion of the **working-age population** that is either employed or actively seeking employment.

3. Worker Population Ratio (WPR)

Share of **employed persons in the total population**.

ISSUES IN EMPLOYMENT MEASUREMENT

Despite improvements, several concerns remain regarding India's employment statistics:

Broad Employment Definition

The **Current Weekly Status** counts a person as employed even if they worked **only one hour in a week**, potentially masking underemployment.

Participation Bias

PLFS may struggle to distinguish **voluntary labour participation from economic distress**, particularly among rural women.

Quality of Employment

The survey does not adequately capture **job quality indicators**, such as wages, job security, working hours, or social protection coverage.

Data Comparability

Initial PLFS rounds were **not fully comparable with earlier NSS surveys**, complicating long-term trend analysis.

Sample Volatility

Smaller sample sizes in **high-frequency monthly estimates** can cause fluctuations, making short-term interpretations difficult.

OTHER SOURCES OF EMPLOYMENT DATA

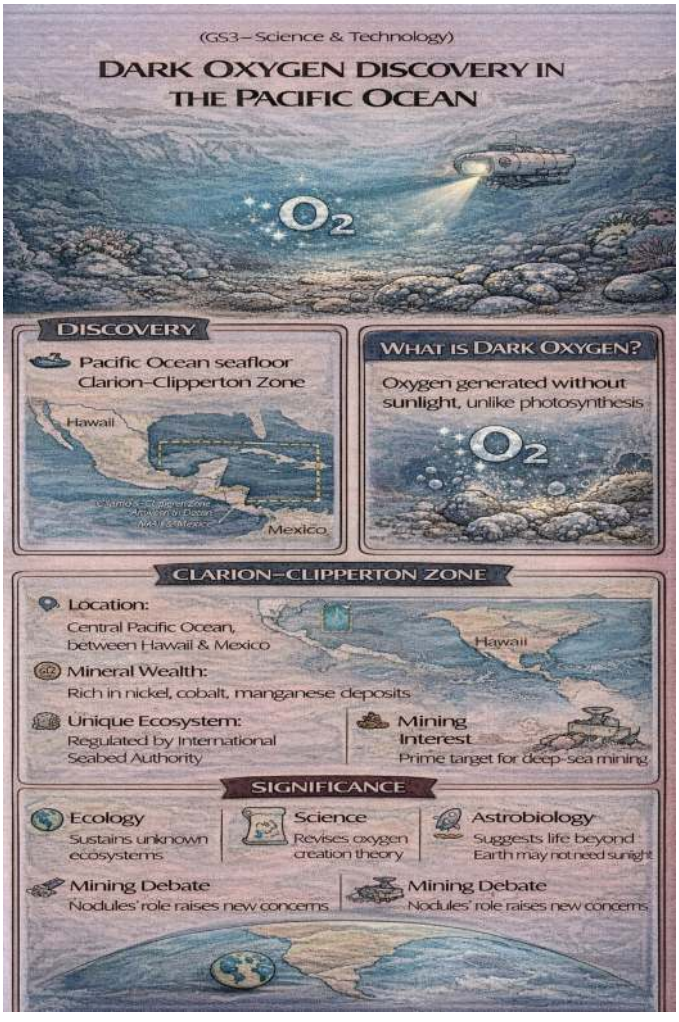
Apart from PLFS, employment information is obtained from multiple datasets:

- **AQEES (Labour Bureau):** Establishment-based employment survey covering organised and unorganised sectors.
- **Administrative Payroll Data:** Subscriber data from **EPFO, ESIC, and NPS**.
- **CMIE Estimates:** Monthly unemployment estimates from the **Consumer Pyramids Household Survey**.
- **Census Data:** Classifies population into **Main Workers, Marginal Workers, and Non-workers**, providing detailed geographic workforce data.

CONCLUSION

Accurate employment measurement remains essential for understanding **India's labour market dynamics**. Strengthening data quality, improving survey design, and integrating administrative datasets can help generate **more reliable employment statistics for policy planning and inclusive growth**.

DARK OXYGEN IN THE DEEP SEA: RETHINKING OXYGEN PRODUCTION



CONTEXT

A recent study published in *Nature Geoscience* reported the discovery of **"dark oxygen"** on the seafloor of the Pacific Ocean. Unlike conventional oxygen generated through **photosynthesis**, dark oxygen forms in deep-sea environments **without sunlight**, challenging long-standing scientific assumptions about how oxygen can originate on Earth.

The phenomenon was identified during deep-sea research in the **Clarion–Clipperton Zone (CCZ)** of the Pacific Ocean.

WHAT IS DARK OXYGEN?

Dark oxygen refers to **oxygen generated in complete darkness**, independent of sunlight-driven photosynthesis.

Traditionally, oxygen production has been linked to plants, algae, and cyanobacteria through **photosynthesis**, which requires sunlight. However, the discovery suggests that **non-biological electrochemical processes** in the deep sea may also produce oxygen.

POSSIBLE MECHANISM

Researchers believe **polymetallic nodules** on the seabed may trigger **electrochemical reactions** capable of splitting seawater molecules into hydrogen and oxygen. These nodules contain metals such as **nickel, cobalt, manganese, and copper**, which may act as natural catalysts.

CLARION–CLIPPERTON ZONE (CCZ)

The discovery was made in the **Clarion–Clipperton Zone**, a vast deep-sea region in the central Pacific Ocean.

Key Features

- **Location:** Between **Hawaii and Mexico** in the Pacific Ocean.
- **Mineral Wealth:** Known for large deposits of **polymetallic nodules** containing nickel, cobalt, manganese, and copper.
- **Mining Interest:** Considered one of the world's most important potential sites for **deep-sea mining**.
- **Governance:** Exploration activities are regulated by the **International Seabed Authority (ISA)**.
- **Ecological Significance:** Hosts unique and fragile **deep-sea ecosystems** with high biodiversity.

SCIENTIFIC SIGNIFICANCE

The discovery of dark oxygen has several implications:

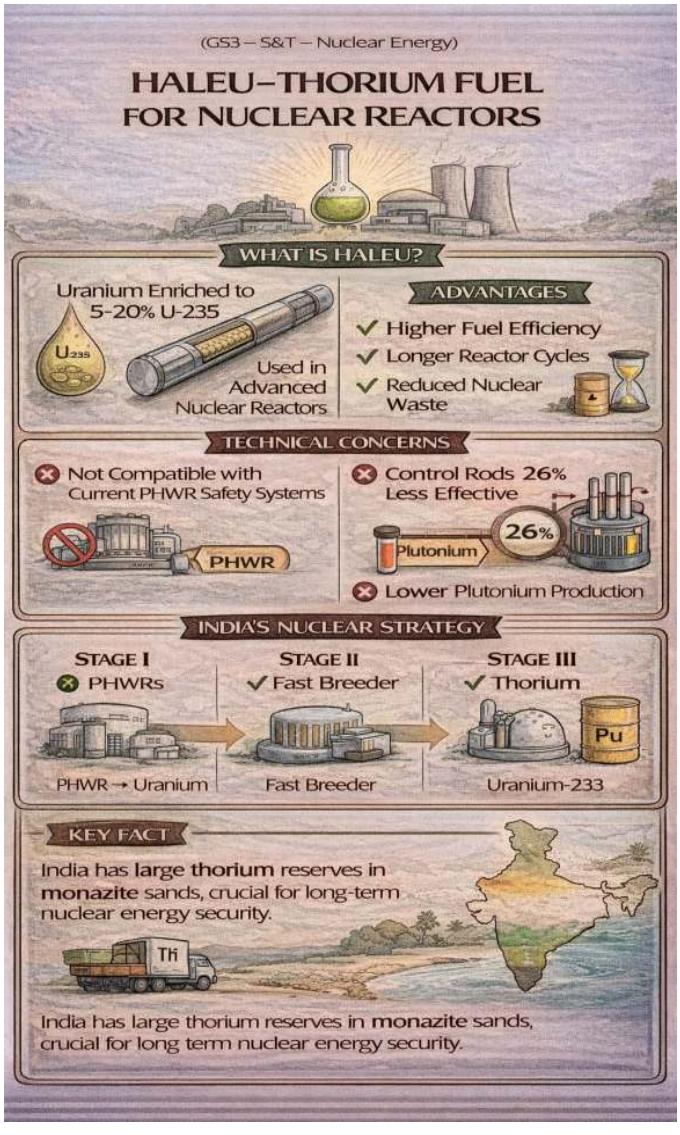
- **Revising Scientific Understanding:** It challenges the conventional view that **oxygen production requires sunlight**.
- **Deep-Sea Ecology:** Oxygen generation on the ocean floor could influence the survival of **deep-sea organisms**.

- **Astrobiology:** The finding may reshape how scientists search for **life on other planets**, suggesting oxygen could form without photosynthesis.
- **Mining Debate:** The discovery raises environmental concerns about **deep-sea mining**, as polymetallic nodules may play a role in sustaining unknown ecosystems.

CONCLUSION

The discovery of dark oxygen opens a new frontier in ocean science and planetary research. Understanding these processes could reshape knowledge of Earth's deep oceans and influence future exploration of extraterrestrial environments.

HALEU–THORIUM FUEL AND ITS IMPLICATIONS FOR INDIA'S NUCLEAR PROGRAMME



CONTEXT

Researchers from the **Bhabha Atomic Research Centre (BARC)** have assessed the feasibility of **HALEU–Thorium nuclear fuel** for India's reactors. Their findings suggest that while the fuel concept offers technological advantages, it may not integrate smoothly with India's existing **three-stage nuclear power programme**.

WHAT IS HALEU–THORIUM FUEL?

HALEU–Thorium fuel is an advanced nuclear fuel that combines **High-Assay Low-Enriched Uranium (HALEU)** with **thorium**.

- **HALEU:** Uranium enriched to about **5–20% U-235**, higher than conventional reactor fuel.
- **Thorium Component:** Thorium-232 can absorb neutrons and eventually produce **uranium-233**, a fissile material.
- This combination forms the basis of the **ANEEL (Advanced Nuclear Energy for Enriched Life)** fuel concept being explored for next-generation nuclear systems.

CLAIMED ADVANTAGES OF HALEU FUEL

1. **Higher Fuel Efficiency:** Greater enrichment allows higher burn-up and more energy generation from the same fuel quantity.
2. **Longer Reactor Operation:** Reactors can operate longer between refuelling cycles.
3. **Reduced Nuclear Waste:** Higher burn-up leads to lower volumes of spent fuel.
4. **Compatibility with Advanced Reactors:** Particularly suitable for **Small Modular Reactors (SMRs)** and other next-generation nuclear designs.
5. **Supports Thorium Utilisation:** When paired with thorium, it can generate **uranium-233**, which is central to future thorium fuel cycles.

TECHNICAL CONCERNS IDENTIFIED BY BARC

Despite potential advantages, BARC scientists highlighted several challenges.

- **Not a Drop-in Replacement:** Thorium absorbs neutrons strongly, reducing the effectiveness of shutdown control rods by about **26%**.
- **Reactor Redesign Required:** Existing **Pressurised Heavy Water Reactors (PHWRs)** may require safety-system modifications.

- **Long Stabilisation Period:** Reactors could take **7–10 years** to reach stable operation, initially producing lower power output.
- **Low Plutonium Production:** HALEU–Thorium fuel produces **much less plutonium**, potentially disrupting India's **second-stage fast breeder programme**, which relies on plutonium as fuel.

INDIA'S THREE-STAGE NUCLEAR POWER PROGRAMME

India's nuclear energy strategy, proposed by **Homi Jehangir Bhabha**, aims to utilise limited uranium resources and abundant thorium reserves.

Stage I – Pressurised Heavy Water Reactors (PHWRs)

- Use **natural uranium** as fuel.
- Produce **plutonium-239**, which is required for the next stage.

Stage II – Fast Breeder Reactors (FBRs)

- Use **plutonium-239 mixed with uranium-238**.
- Generate additional fissile material and initiate limited thorium utilisation.

Stage III – Thorium-Based Reactors

- Use **thorium-232 to produce uranium-233**, enabling a sustainable long-term nuclear fuel cycle.

India possesses **one of the world's largest thorium reserves**, particularly in **monazite sands along the coastal regions**, making thorium central to its long-term nuclear strategy.

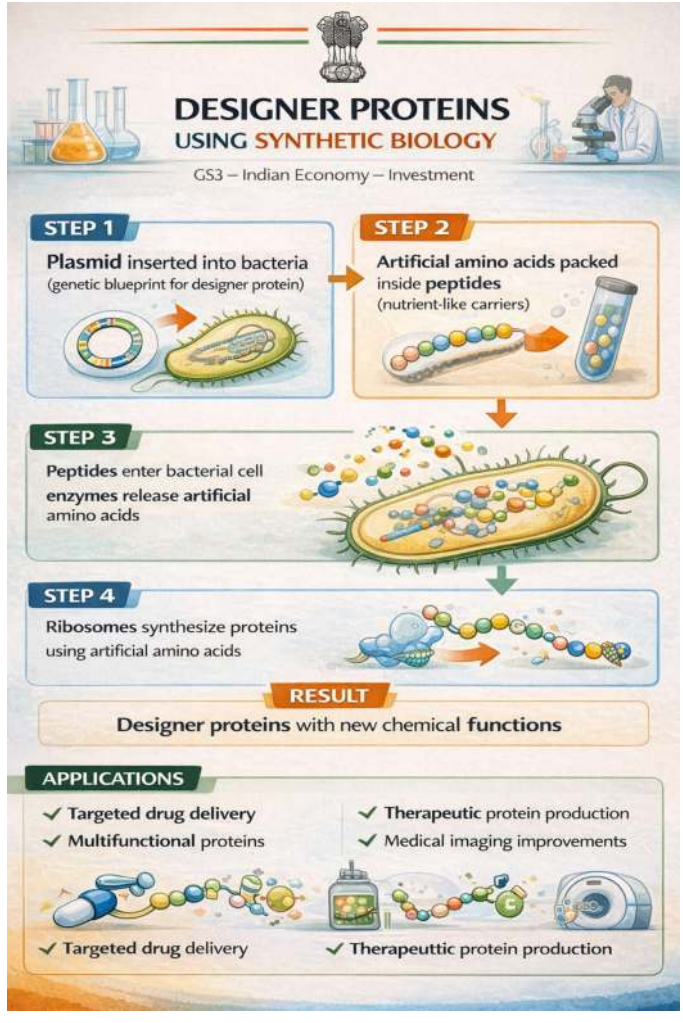
POLICY DEVELOPMENTS

India recently enacted the **SHANTI Act**, enabling **private sector participation in advanced nuclear technologies**, including innovative reactor designs and fuel cycles.

CONCLUSION

While HALEU–Thorium fuel promises improved efficiency and compatibility with advanced reactors, its adoption may conflict with India's carefully structured three-stage nuclear programme. Balancing technological innovation with strategic fuel-cycle planning will be crucial for India's future nuclear energy roadmap.

SCIENTISTS REWIRE BACTERIA TO PRODUCE DESIGNER PROTEINS



CONTEXT

According to *The Hindu*, scientists have developed a **synthetic biology technique** that enables bacteria to produce **designer proteins containing artificial amino acids**. This innovation overcomes a major biological barrier: **bacterial cells normally cannot import artificial amino acids**, as their transport systems recognise only natural amino acids or peptides.

This breakthrough expands the toolkit of **protein engineering**, potentially revolutionising biotechnology, medicine, and drug delivery.

KEY CONCEPTS

- **Amino Acids:** Organic molecules that act as the **building blocks of proteins**. About **20 natural amino acids** are used in living organisms to form polypeptide chains that fold into functional proteins.

- **Artificial Amino Acids:** Synthetic molecules designed to mimic natural amino acids but include **novel chemical groups not found in natural proteins**.
- **Designer Proteins:** Engineered proteins that incorporate **artificial amino acids**, enabling properties such as improved stability, chemical reactivity, or targeted therapeutic functions.

HOW SCIENTISTS PRODUCE DESIGNER PROTEINS IN BACTERIA

The method involves modifying bacterial cells using **synthetic biology and genetic engineering techniques**.

1. Plasmid Insertion

Scientists insert **engineered plasmids**—small circular DNA molecules—into bacteria.

These plasmids carry the **genetic blueprint for the desired designer protein**.

2. Peptide Delivery System

Artificial amino acids are **packed inside short peptides**, which bacteria can absorb because they resemble natural nutrients.

3. Release Inside the Cell

Once the peptide enters the bacterial cell, **enzymes break it down**, releasing the artificial amino acids.

4. Protein Synthesis

The **ribosomes** inside the bacteria incorporate these artificial amino acids during **protein synthesis**, producing the **designer protein**.

IMPORTANT BIOLOGICAL TERMS

- **Peptide:** Short chains of **2–50 amino acids** linked by peptide bonds; longer chains form proteins.
- **Plasmid:** A small circular DNA molecule capable of **independent replication**, commonly used in biotechnology to insert new genes into bacteria.

POTENTIAL APPLICATIONS

- **Targeted Drug Delivery:** Designer proteins can attach drugs to **specific carrier proteins**, allowing precise delivery to diseased tissues.
- **Multifunctional Proteins:** Artificial amino acids allow a single protein to carry **multiple chemical functionalities simultaneously**.
- **Therapeutic Protein Production:** The technology could enable **mass production of advanced therapeutic proteins** with enhanced medical properties.
- **Medical Imaging:** Artificial amino acids may incorporate **fluorescent markers or atoms such as chlorine and fluorine**, improving diagnostic imaging and research techniques.

ENVIRONMENT & ECOLOGY

GS PAPER 3

WILDFIRE SMOKE VORTEX

CONTEXT

Recent atmospheric studies have explained an unusual phenomenon observed after major wildfires: instead of dispersing chaotically, some smoke plumes self-organise into long-lived rotating structures known as **wildfire smoke vortices**. These structures can ascend into the stratosphere and persist for weeks, transporting aerosols across continents and affecting climate systems.

WHAT IS A WILDFIRE SMOKE VORTEX?

A wildfire smoke vortex is a **coherent, rotating smoke plume** formed when intense wildfire emissions aggregate into a compact, buoyant column. Rather than diffusing horizontally, the smoke behaves like a self-contained atmospheric "bubble" with organised rotation. Observations show that such vortices rotate **clockwise in the Northern Hemisphere** and **counter-clockwise in the Southern Hemisphere**, consistent with Coriolis dynamics.

FORMATION MECHANISM

The formation of smoke vortices involves coupled radiative and dynamical processes:

- **Solar Heating:** Black carbon and organic aerosols in wildfire smoke absorb solar radiation efficiently, warming the surrounding air column.
- **Buoyant Ascent:** Heated air becomes less dense, producing strong upward buoyancy that lifts the smoke mass vertically into the upper troposphere or lower stratosphere.
- **Atmospheric Stratification:** As the plume rises, it encounters layers of varying stability and wind shear that impose differential rotational forces.
- **Vortex Collar Development:** The combination of vertical motion and rotational influence generates a coherent spinning envelope around the smoke core, forming a vortex-like structure.

This process resembles a **pyro-cumulonimbus injection**, where wildfire convection injects aerosols into high atmospheric layers.

BEHAVIOUR AND PERSISTENCE

Once formed, wildfire smoke vortices exhibit remarkable stability:

- **Self-Containment:** Rotation suppresses turbulent mixing with surrounding air, preserving the structure.
- **Upward-Tracking Heating:** Continued solar absorption maintains buoyancy and vertical coherence.
- **Longevity:** Observed vortices have persisted for **weeks to months** in the stratosphere.
- **Long-Range Transport:** Such structures can travel **thousands of kilometres**, spreading smoke across continents and oceans.

ENVIRONMENTAL AND CLIMATIC IMPACTS

Wildfire smoke vortices have significant atmospheric consequences:

- **Radiative Forcing:** Stratospheric smoke layers absorb and scatter solar radiation, altering regional energy balance.

- **Temperature Effects:** Localised warming of the stratosphere and cooling beneath the plume have been documented.
- **Air Quality Spread:** Long-distance transport extends pollution impacts far beyond fire zones.
- **Climate Feedbacks:** Increasing wildfire intensity under climate change may enhance the frequency of such vortex injections.

SIGNIFICANCE

Understanding wildfire smoke vortices improves modelling of **aerosol transport, radiative forcing, and wildfire-climate interactions**. The phenomenon demonstrates how extreme fires can influence not only local air quality but also **global atmospheric circulation and climate systems**.

STATE OF INDIA'S ENVIRONMENT 2026: RISING CLIMATE RISKS AND THE NEED FOR RESILIENCE

CONTEXT

The **Centre for Science and Environment (CSE)** has released the **State of India's Environment (SoE) 2026 Report**, highlighting the growing environmental and climate challenges facing India. The report emphasises the increasing frequency of extreme weather events, rising ecological stress, and the urgent need for climate-resilient development strategies.

ABOUT THE STATE OF INDIA'S ENVIRONMENT REPORT

The **State of India's Environment Report** is an annual publication by the Centre for Science and Environment, released since **1982**. CSE, established in **1980** and headquartered in **New Delhi**, is a prominent non-governmental organisation working on environmental sustainability and policy advocacy.

The report aims to provide a comprehensive assessment of India's environmental conditions and emerging ecological risks. It covers diverse themes such as **climate change, extreme weather events, biodiversity loss, pollution, disaster risks, and environmental governance**. Over the years, the report has become an important reference for policymakers, researchers, and civil society organisations working towards sustainable development.

KEY HIGHLIGHTS OF THE SOE 2026 REPORT

1. Rise in Extreme Weather Events

The report notes that **2025 experienced extreme weather events on 99% of days**, the highest level in the past four years. These included **heatwaves, cold waves, intense rainfall, floods, and storms**, indicating the escalating impacts of climate change.

2. Human and Agricultural Losses

Extreme weather events resulted in **4,419 deaths in 2025**, while approximately **17.41 million hectares of crop area** were affected. This highlights the increasing vulnerability of India's agriculture sector and rural livelihoods to climate variability.

3. Regional Vulnerability

Certain states face higher climate risks. **Himachal Pradesh recorded the highest number of extreme weather days**, while **Kerala and Madhya Pradesh** also experienced significant climate-related disruptions.

4. Rising Flood Risks

The report emphasises that climate change is increasing the **frequency and intensity of floods** across many regions. It calls for a transition from a **post-disaster relief approach to proactive resilience planning**.

5. Nature-Based Solutions

To improve climate resilience, the report recommends **nature-based solutions** such as:

- Wetland restoration
- Reconnecting rivers with floodplains
- Rainwater harvesting
- Groundwater recharge
- Restoration of lakes and urban water bodies

6. Human–Tiger Conflict

Increasing habitat pressure and human expansion near forests have intensified **human–tiger conflicts**. Nearly **60 million people live within tiger landscapes across 20 states**, raising challenges for wildlife conservation and community safety.

7. Gaps in Air Pollution Monitoring

Air quality monitoring infrastructure remains inadequate. Only **15% of India's population lives within 10 km of an air quality monitoring station**, leaving **85% of the population outside measurable pollution zones**, particularly in small towns and industrial regions.

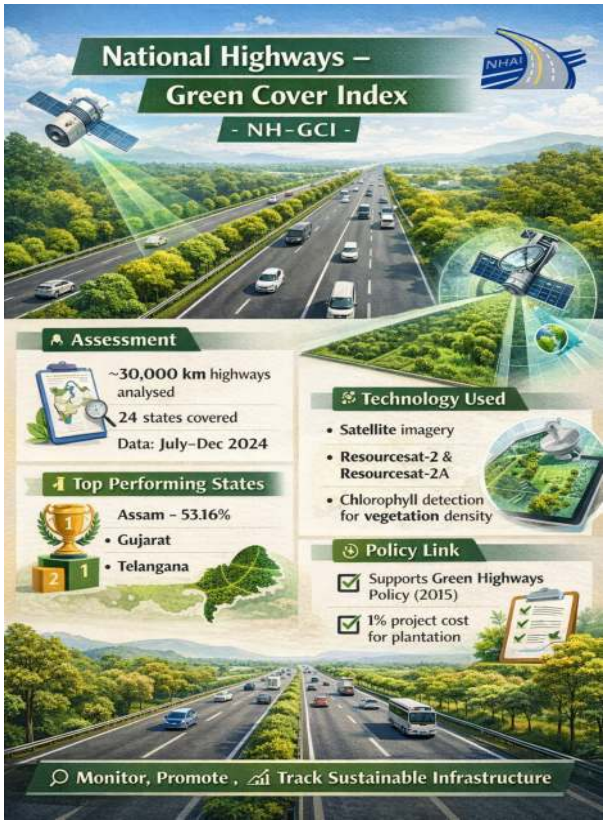
8. Urgent Climate Action Needed

The report warns that global warming may soon **breach the 1.5°C threshold**, making it essential for India and the world to accelerate climate mitigation and adaptation efforts.

CONCLUSION

The **State of India's Environment 2026 Report** underscores the intensifying environmental pressures on India due to climate change, biodiversity stress, and pollution. Addressing these challenges requires **strong environmental governance, climate-resilient infrastructure, and nature-based solutions** to ensure sustainable development and ecological security.

NATIONAL HIGHWAYS – GREEN COVER INDEX (NH-GCI)



CONTEXT

The **National Highways Authority of India** released the **first National Highways – Green Cover Index (NH-GCI) Annual Report (2025–26)** to assess vegetation cover along India's national highways.

The inaugural assessment evaluated nearly **30,000 km of National Highways across 24 states**, using satellite data collected between **July and December 2024**.

According to the report, **Assam recorded the highest highway green cover (53.16%)**, followed by **Gujarat** and **Telangana**, while **Himachal Pradesh** and **Delhi** registered the lowest green cover along their highway networks.

ABOUT THE NATIONAL HIGHWAYS – GREEN COVER INDEX (NH-GCI)

The **NH-GCI** is a scientific framework developed to **quantitatively measure the extent and density of vegetation along National Highways**.

Key Features

- **Scientific Measurement:** The index assesses roadside plantations and vegetation cover along highways using objective, technology-based indicators.
- **Collaboration with Space Agency:** NHAI developed the index through a **three-year Memorandum of Understanding (MoU)** with the **National Remote Sensing Centre**, which functions under the **Indian Space Research Organisation**.
- **Satellite-Based Monitoring:** High-resolution imagery from the **Resourcesat2** and **Resourcesat2A** is used to detect **chlorophyll presence**, enabling accurate estimation of vegetation density along highway corridors.
- **Standardised Green Index:** The NH-GCI creates a consistent national benchmark for comparing green cover performance across states and highway stretches.

SIGNIFICANCE

1. Monitoring Green Infrastructure

The index supports effective monitoring of the **Green Highways Policy**, which mandates that **1% of the total project cost** of national highway projects be allocated for roadside plantation and landscaping.

2. Promoting Sustainable Transport Corridors

Vegetation along highways improves **carbon sequestration, dust control, and micro-climatic regulation**, making transport infrastructure more environmentally sustainable.

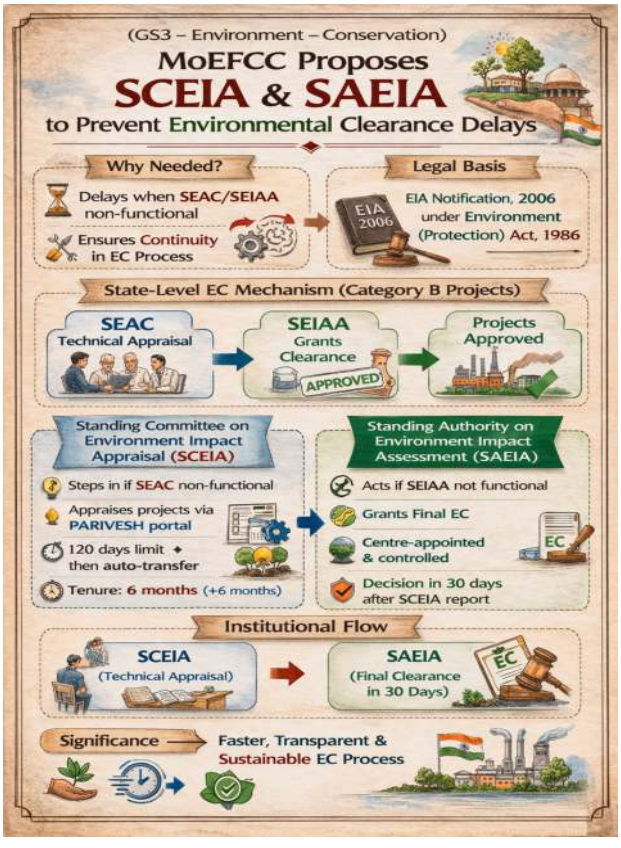
3. Technology-Driven Governance

The use of satellite imagery and remote sensing introduces **data-driven environmental monitoring**, ensuring transparency and periodic evaluation of plantation initiatives.

4. Climate and Biodiversity Benefits

Highway plantations can function as **green corridors**, supporting biodiversity, reducing soil erosion, and improving ecological connectivity.

ENSURING CONTINUITY IN ENVIRONMENTAL CLEARANCES: PROPOSED SCEIA AND SAEIA



CONTEXT

The **Ministry of Environment, Forest and Climate Change (MoEFCC)** has proposed the creation of two new institutional mechanisms—the **Standing Committee on Environment Impact Appraisal (SCEIA)** and the **Standing Authority on Environment Impact Assessment (SAEIA)**. These bodies aim to prevent delays in the **Environmental Clearance (EC)** process when state-level appraisal or approval bodies become non-functional.

The proposal derives its authority from the **Environmental Impact Assessment (EIA) Notification, 2006**, issued under the **Environment (Protection) Act, 1986**.

BACKGROUND: ENVIRONMENTAL CLEARANCE MECHANISM

Environmental clearance is a mandatory process to evaluate the ecological impact of development projects before approval.

At the **state level**, two institutions manage Category B projects:

- **State Expert Appraisal Committee (SEAC):** Provides technical and scientific evaluation of project proposals.
- **State Environment Impact Assessment Authority (SEIAA):** Grants the final Environmental Clearance.

However, delays often occur when these bodies become **non-functional due to tenure expiry or delayed reconstitution**, resulting in administrative bottlenecks.

STANDING COMMITTEE ON ENVIRONMENT IMPACT APPRAISAL (SCEIA)

The **SCEIA** is proposed as an **interim technical appraisal body**.

Purpose:

To ensure continuous appraisal of project proposals when a **State Expert Appraisal Committee (SEAC)** becomes non-functional.

Key Features

- Primarily evaluates **Category B projects** requiring state-level environmental appraisal.
- If SEAC fails to complete appraisal within **120 days**, the application automatically transfers to SCEIA through the **PARIVESH portal**.
- Operates for **six months**, extendable by another **six months** if necessary.
- Its role ends once the **SEAC and SEIAA are reconstituted** for the concerned state.

STANDING AUTHORITY ON ENVIRONMENT IMPACT ASSESSMENT (SAEIA)

The **SAEIA** will act as the **final decision-making authority** in situations where the **State Environment Impact Assessment Authority (SEIAA)** becomes non-functional.

Key Features

- Grants Environmental Clearance for projects when SEIAA fails to issue a decision within the prescribed timeframe.
- The **Central Government directly appoints and controls SAEIA**, unlike SEIAAs which are constituted based on state nominations.
- Ensures continuity and prevents regulatory paralysis in the clearance process.

INSTITUTIONAL RELATIONSHIP BETWEEN SCEIA AND SAEIA

The two bodies function in a **coordinated framework**:

- **SCEIA:** Conducts technical evaluation and project appraisal.
- **SAEIA:** Takes the final decision regarding Environmental Clearance.

Once SCEIA submits its recommendations, **SAEIA must issue a final decision within 30 days**.

PROJECT CATEGORIES UNDER EIA

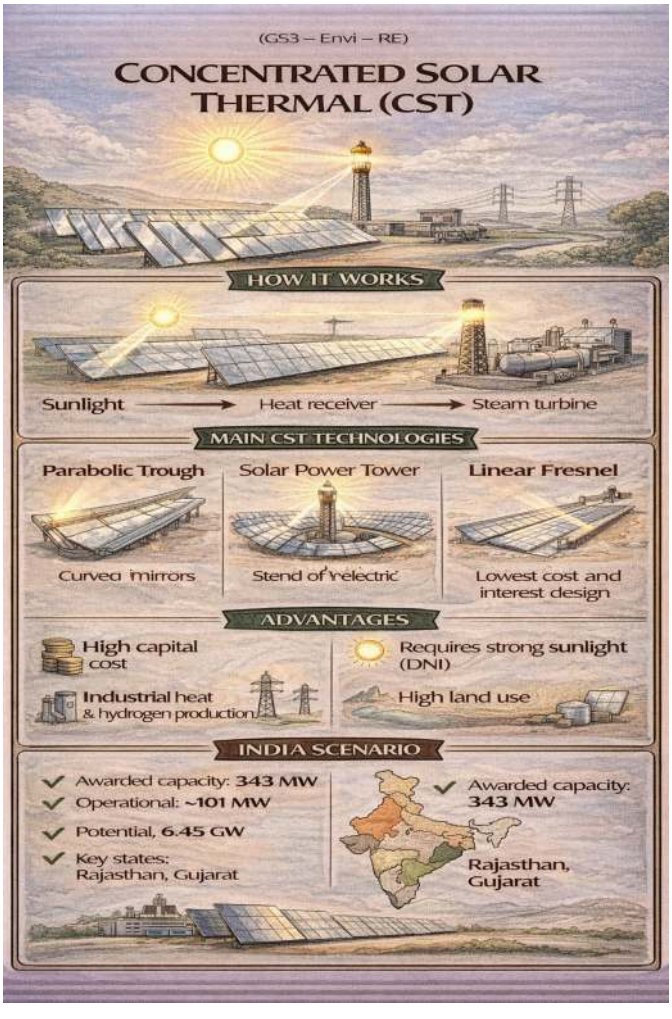
Environmental projects are broadly classified as:

- **Category A Projects:** Large-scale projects requiring clearance from **MoEFCC** after appraisal by the **Expert Appraisal Committee (EAC)**.
- **Category B Projects:** Smaller projects with localised environmental impact, appraised by **SEAC** and approved by **SEIAA**.

SIGNIFICANCE

The proposed mechanisms aim to strengthen **institutional efficiency, regulatory continuity, and transparency** in environmental governance. By ensuring that project approvals do not stall due to administrative gaps, the reform seeks to balance **economic development with environmental protection**.

CONCENTRATED SOLAR THERMAL: A RENEWABLE SOLUTION FOR INDUSTRIAL HEAT



CONTEXT

Recent geopolitical disruptions affecting global natural gas supplies have renewed attention on **Concentrated Solar Thermal (CST)** technology as a reliable domestic renewable energy option. This is particularly important because **industrial heat accounts for nearly 25% of India's total energy consumption**, much of which currently relies on fossil fuels.

WHAT IS CONCENTRATED SOLAR THERMAL (CST)?

Concentrated Solar Thermal (CST) is a renewable energy technology that uses **mirrors or lenses to focus sunlight onto a receiver**, producing high temperatures that generate steam and electricity.

- **Working Principle:** Concentrated sunlight heats a working fluid (oil, water, or molten salt).
- The heat either produces **steam to drive turbines** for electricity generation or is stored in **thermal storage media** like molten salt for later use.
- **Key Difference from Solar PV:**
  - **Solar PV:** Converts sunlight directly into electricity.
  - **CST:** Converts sunlight into **heat first**, then electricity.

MAJOR TYPES OF CST TECHNOLOGIES

1. Parabolic Trough

- Uses curved mirrors to focus sunlight on a receiver tube.
- Most widely deployed CST technology globally.

2. Solar Power Tower

- Thousands of heliostat mirrors concentrate sunlight onto a receiver on a central tower.
- Provides the **highest efficiency and large-scale thermal storage**.

3. Linear Fresnel

- Uses rows of flat mirrors reflecting sunlight onto a fixed receiver.
- **Lower cost and simpler design** compared to other systems.

4. Parabolic Dish

- Dish-shaped mirrors focus sunlight on a central receiver.
- Best suited for **small modular applications**.

STRATEGIC ADVANTAGES OF CST

- **Thermal Storage Capability:** Molten salt storage enables electricity generation even **after sunset**, overcoming intermittency.

- **Stable Grid Support:** CST can provide **dispatchable power**, supporting grid stability compared to variable solar PV and wind.
- **Industrial Applications:** High-temperature heat supports **industrial processes, desalination, and green hydrogen production**.
- **Reduced Mineral Dependence:** Uses abundant materials such as **mirrors and molten salts**, lowering reliance on critical battery minerals.

KEY CHALLENGES

- **High Capital Cost:** Mirror fields, heat receivers, and storage systems increase initial investment compared to solar PV.
- **Dependence on Direct Normal Irradiance (DNI):** Efficient operation requires **clear skies and high solar intensity**.
- **Water Requirement:** Steam turbines require cooling water, which is challenging in desert areas where CST performs best.
- **Land Requirement:** CST plants require **1.5–3 times more land per MW** than solar PV installations.

CST LANDSCAPE IN INDIA

- **Installed Capacity:** About **343 MW of CST capacity has been awarded**, but only **~101 MW is currently operational**.
- **Industrial Potential:** The **Ministry of New and Renewable Energy (MNRE)** estimates **6.45 GW potential** in sectors such as dairy, textiles, and chemicals.
- **Geographical Hubs:** Deployment is concentrated in **high solar irradiance regions like Rajasthan and Gujarat**.
- **Policy Gap:** India lacks a dedicated national policy promoting **renewable industrial heat technologies like CST**.
- **Carbon Markets:** The **Carbon Credit Trading Scheme (CCTS)** currently does not recognise emissions avoided through direct solar heat technologies.

CONCLUSION

Concentrated Solar Thermal technology offers an opportunity to decarbonise **industrial heat demand**, a major contributor to India's energy consumption. With targeted policy support, improved financing, and integration with green hydrogen initiatives, CST could become an important component of India's clean energy transition.

SECURITY & DISASTER MANAGEMENT

GS PAPER 3

NATIONAL DAM SAFETY AUTHORITY (NDSA)

CONTEXT

According to *Doordarshan News*, Union Minister of Jal Shakti **Shri C. R. Paatil** inaugurated the **new office of the National Dam Safety Authority (NDSA)** and launched its official website. During the event, the government introduced **digital platforms to strengthen dam safety monitoring**, signalling a move toward **technology-driven water infrastructure governance**.

DIGITAL INITIATIVES LAUNCHED

1. NETRA (AI-based Platform)

- An **Artificial Intelligence-enabled platform** that provides **quick access to dam safety guidelines and standards**.
- It assists engineers and administrators in **decision-making and regulatory compliance**.

2. Rashtriya Bandh Suraksha Darpan (RBSD)

- A **visualisation platform developed by the Centre for Development of Advanced Computing (C-DAC)**.
- It analyses **dam break scenarios and downstream impacts**, helping authorities plan **disaster mitigation and emergency responses**.

ABOUT THE NATIONAL DAM SAFETY AUTHORITY (NDSA)

The **National Dam Safety Authority (NDSA)** is a **statutory body established under the Dam Safety Act, 2021** to regulate and supervise dam safety in India.

Institutional Framework

- **Ministry**: Ministry of Jal Shakti
- **Headquarters**: New Delhi
- **Leadership**: Headed by a **Chairman** and supported by **five specialised members**

Key Functions

- **Regulatory Oversight**: Ensures the **structural integrity and safe operation of specified dams** across the country.
- **Policy Implementation:** Implements standards and policies framed by the **National Committee on Dam Safety (NCDS)**.
- **Dispute Resolution:** Acts as an adjudicating authority to resolve disputes between **State Dam Safety Organisations (SDSOs)** or between an SDSO and dam owners.

- **Inter-State Dam Monitoring:** Functions as the **State Dam Safety Organisation (SDSO)** for:
  - Dams spanning multiple states
  - Dams located in one state but owned by another
  - Dams owned by the Central Government
- **Accreditation:** Accredits agencies involved in **dam construction, design, and alteration activities**.

KEY CONCEPTS

- **Specified Dams:** Dams **higher than 15 metres**, or **10–15 metres with special structural or risk conditions**, as defined under the **Dam Safety Act, 2021**.
- **National Committee on Dam Safety (NCDS):** A statutory body responsible for **formulating national dam safety policies and standards**, chaired by the **Chairman of the Central Water Commission (CWC)**.
- **State Dam Safety Organisation (SDSO):** State-level authorities responsible for **inspection, monitoring, and safety compliance of dams** within their jurisdiction.

SIGNIFICANCE

- **Infrastructure Safety**: Enhances monitoring of over **5,000 large dams in India**.
- **Disaster Risk Reduction**: Supports early risk assessment and emergency preparedness.
- **Technology Integration**: AI tools like **NETRA** and data platforms like **RBSD** improve real-time monitoring and decision-making.

Together, these measures strengthen India's efforts to ensure **safe water infrastructure and resilient disaster management systems**.