



## 1. ARE METHANE EMISSIONS IN INDIA BEING UNDERESTIMATED?

### 1.1 Why is this in News?

- Satellite-based assessments conducted between 2023–25, including ISRO studies, indicate that methane emissions from Indian landfills are significantly higher than official model-based estimates.
- The National Green Tribunal has formed expert committees to verify satellite-detected methane hotspots such as:
  - Ghazipur (Delhi)
  - Bhalswa (Delhi)
  - Pirana (Ahmedabad)
  - KanjurMarg (Mumbai)
- The findings highlight a major data gap in India's waste-sector emissions, impacting:
  - India's climate commitments under NDCs
  - Urban safety due to landfill fires and explosions
  - Public health and air quality
- Issue gains renewed policy relevance under:
  - Swachh Bharat Mission
  - GOBARdhan Scheme
  - Revised Municipal Solid Waste (MSW) Rules

### 1.2 Relevance

#### GS III – Environment & Climate Change

- Methane as a short-lived climate pollutant (SLCP)
- Waste-sector emissions and climate mitigation
- Accuracy of emissions inventories under NDCs

#### GS III – Urban Development

- Solid waste management failures
- Landfill fires and urban safety risks

### 1.3 Methane: Conceptual Basics

#### What is Methane ( $\text{CH}_4$ ) ?

- Classified as a short-lived climate pollutant.
- Has nearly 84 times the global warming potential of  $\text{CO}_2$  over a 20-year period.
- Atmospheric lifetime is approximately 12 years.

#### Why Methane is Dangerous in Landfills



- Generated through anaerobic decomposition of organic waste.
- Accumulates in open dumps, leading to:
  - Fires
  - Explosions
  - Release of toxic smoke

### **The Methane Paradox**

- Useful as:
  - Bio-CNG
  - Piped Natural Gas
  - Power generation fuel
- Becomes a major climate and urban hazard when unmanaged.

### **1.4 Landfills as Methane Generators**

- Methane generation processes mimic natural gas formation but occur faster due to:
  - High wet waste content
  - Poor segregation
  - Lack of engineered capping
  - Absence of gas capture systems

### **India-Specific Conditions**

- Dominance of open dumps instead of sanitary landfills.
- High moisture and ambient heat accelerate methane generation.

### **1.5 India's Methane Profile (Waste Sector)**

- Approximately 15% of India's methane emissions originate from the waste sector.
- Waste management offers quick mitigation gains compared to agriculture or energy.
- Technologies, policies, and financial incentives already exist.

### **1.6 The Measurement Challenge**

#### **Model-Based Estimation**

- Based on waste inflow volumes and standard decay factors.
- Relies on outdated, state-level aggregated data.
- Cannot identify location-specific hotspots.
- Highly assumption-driven.

#### **Ground-Based Monitoring**

- Requires expensive sensors.



- Needs skilled manpower and regular maintenance.
- Difficult to scale across Indian cities.

### 1.7 Satellite Monitoring: A Breakthrough

#### Types of Satellite Monitoring

- Regional-scale monitoring for national and sub-national trends.
- High-resolution hotspot detection at small spatial scales.

#### Key Platforms and Missions

- ISRO methane studies.
- International missions:
  - CarbonMapper (Tanager)
  - SRON (Netherlands)
- Data aggregators:
  - ClimateTRACE
  - WasteMap

### 1.8 What Satellites Reveal: The Emissions Gap

#### Global Trend

- Actual landfill methane emissions are about 1.8 times higher than model estimates.

#### Indian City Evidence

- **Delhi**
  - Official estimate (2018): ~1.07 Mt CO<sub>2</sub> e (entire waste sector)
  - Satellite: Ghazipur + Bhalswa alone emit ~0.85–0.96 Mt CO<sub>2</sub> e
- **Mumbai**
  - Model: Kanjurmarg ~11% of city emissions
  - Satellite: ~1.05 Mt CO<sub>2</sub> e (nearly 10 times higher)
- **Ahmedabad**
  - Gujarat model estimate: ~0.73 Mt CO<sub>2</sub> e
  - Pirana landfill alone: ~0.60–0.81 Mt CO<sub>2</sub> e

#### Inference

- Failure of gas capture mechanisms.
- Accelerated organic decomposition.
- Engineering and governance blind spots.

### 1.9 Why This Matters Beyond Climate



- Increased risk of landfill fires and explosions.
- Public health impacts due to toxic emissions and PM spikes.
- Weak accountability of Urban Local Bodies.
- Loss of economic potential from Bio-CNG and waste-to-energy.

### 1.10 Way Forward: Three-Pillar Strategy

#### Expanding Satellite Coverage

- Mandatory satellite monitoring of major dumpsites.
- Public emission dashboards for transparency.

#### Ground Validation Systems

- Rapid-response teams for satellite-flagged hotspots.
- Identification of:
  - Poor capping
  - Gas leaks
  - Illegal dumping

#### Integrated Data Architecture

- Standardised data-sharing among:
  - ULBs
  - SPCBs
  - NGT
  - CAQM
- Expansion of central waste data portal to include methane tracking.

### 1.11 Policy and Institutional Convergence

- Swachh Bharat Mission to integrate methane reduction targets.
- GOBARdhan Scheme to scale Bio-CNG plants.
- CAQM to oversee landfill emissions in NCR.
- SAPCCs to incorporate satellite-based waste data.

### 1.12 Key Observation

- Methane mitigation from waste is India's lowest-hanging climate opportunity.
- High impact, low cost, immediate benefits.
- Core governance lesson: *What gets measured gets managed.*

### 1.13 Conclusion



- Integration of satellite intelligence, ground action, and data governance can convert landfill methane from a climate threat into India's fastest climate solution.

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## 2. MH-60R SEAHAWK HELICOPTERS

### 2.1 Why is this in News?

- Indian Navy to commission its second MH-60R squadron (INAS 335 – Ospreys) at INS Hansa, Goa.
- First squadron commissioned at Kochi in March 2024.
- Represents a milestone in naval aviation modernisation.

### 2.2 Relevance

#### GS III – Defence & Internal Security

- Military modernisation.
- Force multipliers in naval warfare.

#### GS II – International Relations

- India-US defence cooperation.
- Indo-Pacific and IOR security.

### 2.3 MH-60R Seahawk: Overview

- Manufactured by Lockheed Martin (Sikorsky), USA.
- Multi-role naval helicopter.
- Replaces ageing Sea King fleet.

### 2.4 Operational Roles

- Anti-Submarine Warfare (ASW).
- Anti-Surface Warfare (ASuW).
- Surveillance and reconnaissance.
- Search and Rescue.
- Maritime interdiction.

### 2.5 Key Capabilities

#### Sensors and Avionics

- Maritime surveillance radar.
- Dipping sonar and sonobuoys.
- EO/IR systems.

#### Weapons Suite



- Air-launched torpedoes.
- Anti-ship missiles.

#### **Network-Centric Warfare**

- Integrated with fleet operations.
- Real-time data sharing with command centres.

#### **2.6 Strategic Significance**

##### **Blue-Water Navy Capability**

- Extends operational reach.
- Enables sustained IOR deployments.

##### **Anti-Submarine Edge**

- Counters expanding Chinese submarine presence.
- Enhances sea denial and deterrence.

##### **Maritime Domain Awareness**

- Surveillance over SLOCs and chokepoints.
- Supports QUAD and regional security frameworks.

#### **2.7 Operational Impact of INAS 335**

- Focus on western seaboard and Arabian Sea.
- Protects maritime trade routes.
- Enhances response to piracy and maritime terrorism.

#### **2.8 Conclusion**

- MH-60R induction strengthens India's maritime strike, surveillance, and deterrence posture.

### **3. OVERHAUL OF HIGHER EDUCATION REGULATORY FRAMEWORK (VBSA BILL, 2025)**

#### **3.1 Why is this in News?**

- Union Government proposes Viksit Bharat Shiksha Adhishtan Bill, 2025.
- Seeks to subsume UGC, AICTE, and NCTE.
- Legislative backbone for NEP 2020 implementation.

#### **3.2 Relevance**

##### **GS II – Governance**

- Regulatory reforms and federal issues.



### GS III – Human Capital

- Higher education quality and innovation.

### GS II – Social Sector

- Education reforms under NEP.

### 3.3 Existing Regulatory Issues

- Overlapping jurisdictions.
- Excessive compliance burden.
- Input-focused regulation.
- Weak coordination between funding and accreditation.

### 3.4 VBSA: Institutional Design

- 12-member umbrella commission.
- Three councils:
  - Regulation
  - Accreditation
  - Standards

### 3.5 Major Structural Reforms

- Single regulator model.
- Separation of funding from regulation.
- Outcome-based accreditation.

### 3.6 Scope and Exclusions

- Applies to all HEIs except medicine, law, pharmacy, nursing, veterinary sciences.

### 3.7 Internationalisation

- Regulation of foreign universities in India.
- Indian campuses abroad.

### 3.8 Concerns

- Centralisation vs federal autonomy.
- Ministry-controlled funding.
- Transition risks.

### 3.9 Conclusion

- VBSA marks shift from control-based to quality-led governance.

## 4. TRAT PROVINCE (THAILAND–CAMBODIA BORDER TENSIONS)

### 4.1 Why is this in News?



- Thailand imposed a curfew in five districts of **Trat province** following armed clashes with Cambodia spreading to coastal border areas.
- Hostilities continue despite Cambodia expressing openness to a ceasefire and claims of US-led mediation.
- The first confirmed civilian death in the current escalation has been reported in Thailand.
- The conflict has displaced hundreds of thousands on both sides, indicating a serious regional security escalation.

#### 4.2 Relevance

##### GS II – International Relations

- Border disputes and conflict escalation.
- ASEAN's role in regional peace and security.

##### GS III – Security

- Regional instability.
- Humanitarian and displacement consequences of armed conflict.

#### 4.3 Where is Trat Province?

- Located in **southeastern Thailand**, bordering Cambodia's Koh Kong province.
- Holds strategic importance due to:
  - Coastal access to the Gulf of Thailand.
  - Proximity to disputed land and maritime boundary areas.
- Curfew applies to five mainland districts along the border.
- Tourist islands such as **Koh Chang and Koh Kood** excluded to protect economic activity.

#### 4.4 Thailand–Cambodia Border Dispute: Background

- Rooted in colonial-era boundary demarcations.
- Disputes arise from differing interpretations of:
  - French Indochina maps.
  - Thai historical claims.
- Historically sensitive regions include:
  - Preah Vihear temple area.
  - Eastern and southeastern border zones.
- Periodic military skirmishes despite ASEAN norms of peaceful dispute resolution.

#### 4.5 Significance of Coastal Expansion



- Indicates horizontal escalation beyond traditional land-based flashpoints.
- Raises risks of:
  - Maritime incidents in the Gulf of Thailand.
  - Disruption to fishing and coastal trade.
- Attracts international concern due to proximity to major sea lanes.

#### 4.6 Strategic Implications

##### Regional Security

- Challenges ASEAN's credibility as a conflict-management platform.
- Risk of increased militarisation of Southeast Asian coastal borders.

##### Humanitarian Impact

- Large-scale civilian displacement.
- Civilian casualties signal a shift from limited skirmishes to population-impacting conflict.

##### Great Power Context

- External mediation efforts reflect growing interest of extra-regional powers.
- Highlights strategic sensitivity of the Indo-Pacific periphery.

#### 4.7 Conclusion

- The curfew in Trat province marks a dangerous widening of the Thailand–Cambodia border conflict, underlining the fragility of regional peace mechanisms and the enduring volatility of colonial-era boundary disputes in Southeast Asia.

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## 5. INSURANCE LAWS (AMENDMENT) BILL, 2025

#### 5.1 Why is this in News?

- The Union Cabinet has approved the **Insurance Laws (Amendment) Bill, 2025** for introduction in Parliament.
- The Bill proposes wide-ranging reforms, including:
  - Raising FDI limit in insurance from 74% to 100%.
  - Expanding regulatory and enforcement powers of IRDAI.
  - Reforming capital norms and simplifying business operations.
- Aims to align India's insurance sector with global best practices under the **Viksit Bharat 2047** vision.

#### 5.2 Relevance

##### GS III – Economy



- Financial sector reforms.
- Insurance penetration and risk management.
- Foreign Direct Investment liberalisation.

### GS II – Governance

- Powers and functioning of regulatory institutions (IRDAI).

### 5.3 Background: India's Insurance Framework

- Governed by:
  - Insurance Act, 1938
  - IRDA Act, 1999
- Persistent challenges include:
  - Low insurance penetration (~4% vs global average ~7%).
  - Capital constraints.
  - Limited product innovation.
  - Fragmented regulation and slow approvals.

### 5.4 Key Provisions of the Bill

#### FDI Liberalisation

- FDI cap increased to 100%.
- Intended to:
  - Attract long-term foreign capital.
  - Strengthen solvency and balance sheets.
  - Facilitate technology infusion and risk management.
- Expected outcomes:
  - Entry of global insurers and reinsurers.
  - Increased competition and consumer choice.

#### Capital and Entry Norms Reform

- Proposal to lower minimum capital requirements:
  - Insurers: currently ₹100 crore.
  - Reinsurers: currently ₹200 crore.
- Rationale:
  - Existing norms act as barriers for micro-insurance, digital-only, and specialised insurers.
- Encourages region-specific, low-cost insurance models.



### Enhanced Powers to IRDAI

- IRDAI to receive stronger enforcement powers similar to SEBI.
- Authority to:
  - Recover illegally earned profits.
  - Impose higher penalties.
- Shifts regulation from procedural oversight to outcome-based supervision.

### Simplified Regulatory Processes

- One-time registration replacing repeated approvals.
- Risk-based supervision instead of rule-based micromanagement.
- Standard Operating Procedures to:
  - Improve predictability.
  - Reduce regulatory delays.
- Faster approvals for products, expansion, and intermediaries.

### Reinsurance and GIFT-IFSC Push

- Greater operational flexibility for:
  - Foreign reinsurance branches.
  - IFSC-based insurance entities.
- Aims to make India a regional reinsurance hub.
- Reduces capital outflows to overseas markets.

#### 5.5 What the Bill Does Not Permit

- Composite licences combining life, non-life, and health insurance are disallowed.
- Rationale:
  - Different underwriting risks and actuarial models.
  - Prevention of systemic risk and regulatory arbitrage.
- Proposal for captive insurers deferred due to solvency and risk-pricing concerns.

#### 5.6 Economic and Governance Significance

- Insurance acts as growth infrastructure by:
  - Mobilising long-term savings.
  - Reducing household vulnerability.
  - Supporting infrastructure and climate risk coverage.
- Market impact includes:
  - Greater competition.



- Improved product diversity.
- Better penetration in health, crop, and catastrophe insurance.

### 5.7 Risks and Criticisms

- Potential over-centralisation of power in IRDAI.
- Concerns over:
  - Profit repatriation.
  - Reduced domestic promoter control.
- Effectiveness depends on regulatory capacity and consumer protection.

### 5.8 Conclusion

- The Bill represents a shift from protectionist regulation to competitive, capital-driven insurance governance.
- Its success hinges on strong IRDAI oversight, prudential safeguards, and consumer-centric supervision.

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## 6. KARNATAKA HATE SPEECH AND HATE CRIMES (PREVENTION) BILL, 2025

### 6.1 Why is this in News?

- The Karnataka government has introduced the Karnataka Hate Speech and Hate Crimes (Prevention) Bill, 2025 in the State Legislative Assembly.
- The Bill proposes:
  - A broad statutory definition of hate speech.
  - Stricter punishments than existing central laws.
  - Executive powers to block online content deemed hateful.
- Has triggered debate on free speech, federal overlap, overcriminalisation, and constitutional validity.

### 6.2 Relevance

#### GS II – Polity

- Fundamental Rights: Article 19(1)(a) vs Article 19(2).
- Federalism and legislative competence.

#### GS III – Internal Security

- Social cohesion and communal harmony.
- Online hate ecosystems.

### 6.3 Existing Legal Framework on Hate Speech

- Indian Penal Code (now Bharatiya Nyaya Sanhita):



- Section 153A / 196 BNS – Promoting enmity.
- Section 295A – Outraging religious feelings.
- Section 505 – Statements conducing to public mischief.
- Judicial position:
  - No single codified definition of hate speech.
  - Courts assess context, intent, and tendency to incite violence.
- Supreme Court trend:
  - Emphasis on “bail, not jail”.
  - Caution against chilling effects on free speech.

#### **6.4 Key Provisions of the Karnataka Bill**

##### **Expanded Definition of Hate Speech**

- Covers spoken, written, symbolic, and electronic communication.
- Targets speech against individuals or groups based on:
  - Religion, caste, race, gender, language, residence, disability, etc.
- Does not require direct incitement to violence.

##### **Enhanced Punishments**

- Mandatory minimum imprisonment of one year.
- Maximum punishment up to seven years.
- Enhanced penalties up to ten years if other laws also apply.

##### **Executive Takedown Powers**

- State empowered to order removal or blocking of online content.
- Directions issued to intermediaries and platforms.
- Appeals mechanism largely executive-driven with limited judicial oversight.

##### **Collective Liability**

- Organisations can be held liable for acts of members.
- Burden shifts to accused to prove due diligence.
- Raises presumption-of-guilt concerns.

#### **6.5 Constitutional and Legal Concerns**

##### **Free Speech and Proportionality**

- Restrictions must fall strictly within Article 19(2).
- Critics argue the Bill goes beyond reasonable restrictions.

##### **Vagueness Doctrine**



- Supreme Court has struck down laws using vague terms.
- Expressions like “prejudicial interest” and “humiliation” lack precise thresholds.

### Chilling Effect

- Fear of prosecution may deter:
  - Journalistic reporting.
  - Academic inquiry.
  - Artistic expression.
- Exemptions provided but seen as narrow and discretionary.

### Federalism Issues

- Criminal law lies in the Concurrent List.
- Risk of inconsistency with central laws like BNS and IT Act.
- Potential fragmentation of hate speech regulation across States.

### 6.6 Arguments in Favour

- Addresses rising identity-based violence.
- Responds to online hate ecosystems.
- Provides a victim-centric and deterrent framework.

### 6.7 Arguments Against

- Overcriminalisation of speech.
- Executive overreach in content regulation.
- Risk of misuse against dissenters and political opponents.
- Inconsistency with Supreme Court free speech jurisprudence.

### 6.8 Takeaway

- The Bill reflects a shift from harm-based regulation to speech-based criminalisation.
- The central issue is constitutional precision and proportionality.

### 6.9 Conclusion

- While the Bill aims to curb hate and protect social harmony, its expansive scope, harsh penalties, and executive-heavy enforcement raise serious concerns regarding free speech, federal balance, and constitutional overreach.

16<sup>th</sup> December 2025: Daily MCQs

### Q1. With reference to methane emissions from landfills in India, consider the following statements:

1. Methane is a short-lived climate pollutant with a higher global warming potential than carbon dioxide over a 20-year period.



2. Satellite-based monitoring has revealed that landfill methane emissions are significantly lower than India's model-based estimates.
3. Waste sector methane emissions offer quicker mitigation opportunities compared to agriculture.

Which of the statements given above is/are correct?

- A. 1 and 3 only
- B. 1 only
- C. 2 and 3 only
- D. 1, 2 and 3

**Answer:** A

**Explanation:**

Methane has very high short-term warming potential, and satellite data shows emissions are higher—not lower—than model estimates. Waste sector mitigation is comparatively quicker.

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**Q2. Consider the following regarding the MH-60R Seahawk helicopters:**

1. They are designed primarily for anti-submarine and anti-surface warfare.
2. They replace India's Chetak helicopters in naval aviation.
3. Their induction strengthens India's maritime domain awareness in the Indian Ocean Region.

Which of the above statements is/are correct?

- A. 1 and 3 only
- B. 1 only
- C. 2 and 3 only
- D. 1, 2 and 3

**Answer:** A

**Explanation:**

MH-60R replaces ageing Sea King helicopters, not Chetak. They are critical for ASW, ASuW, and MDA.

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**Q3. With reference to the Viksit Bharat Shiksha Adhishtan (VBSA) Bill, 2025, consider the following statements:**

1. It proposes a single umbrella regulator for higher education.
2. Medical and legal education institutions are included under its regulatory ambit.
3. It aims to shift accreditation from input-based to outcome-based evaluation.

Which of the statements given above is/are correct?

- A. 1 and 3 only
- B. 1 only
- C. 2 and 3 only
- D. 1, 2 and 3



**Answer: A**

**Explanation:**

Medical and legal education are excluded as they are governed by separate statutory councils.

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**Q4. With reference to the Insurance Laws (Amendment) Bill, 2025, consider the following statements:**

1. The Bill proposes to raise the FDI limit in insurance to 100%.
2. It allows composite insurance licences covering life, non-life, and health insurance.
3. It seeks to grant enhanced enforcement powers to IRDAI.

Which of the statements given above is/are correct?

- A. 1 and 3 only
- B. 2 only
- C. 1 only
- D. 1, 2 and 3

**Answer: A**

**Explanation:**

Composite licences are not permitted. The Bill raises FDI and strengthens IRDAI's powers.

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**Q5. With reference to the Karnataka Hate Speech and Hate Crimes (Prevention) Bill, 2025, consider the following statements:**

1. It introduces a statutory definition of hate speech broader than existing central laws.
2. It mandates a minimum term of imprisonment for certain hate speech offences.
3. It requires prior judicial approval before blocking online content.

Which of the statements given above is/are correct?

- A. 1 and 2 only
- B. 1 only
- C. 2 and 3 only
- D. 1, 2 and 3

**Answer: A**

**Explanation:**

The Bill provides executive takedown powers without mandatory prior judicial approval.

**Mains:** Satellite-based monitoring has revealed serious underestimation of methane emissions from Indian landfills. Examine its implications for India's climate commitments, urban governance, and public health. 250 words.