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Daily News Analysis

# The Hindu Important News Articles & Editorial For UPSC CSE

## Wednesday, 30 April, 2025

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In the aftermath of the **April 22 Pahalgam terror attack**, the Union Home Ministry has directed repatriation of certain Pakistani and PoK nationals residing in Jammu & Kashmir. This has reignited debate over the **future of women who came to India under the 2010 Rehabilitation Policy**, especially those married to former Kashmiri militants.

Women walk past the Pahalgam police station on Tuesday. IMRAN NISSAR

# Repatriation shadow on wives of former militants in J&K

**Peerzada Ashiq**
SRINAGAR

Security agencies on Tuesday started the repatriation of residents of Pakistan and Pakistan-occupied Kashmir (PoK) from J&K in the wake of the April 22 Pahalgam attack and the consequent directive from the Ministry of Home Affairs. Sources said around 60 Pakistanis will be repatriated in the coming days from the Union Territory. The measure has also cast a shadow on the future of over 150 women who married Kashmiri men and returned to the Valley under a government rehabilitation policy for militants.

In the Jammu division, amid emotional scenes and processions, at least 11 Pakistani nationals were pushed back from the Mendhar subdivision in Poonch. Locals said a Pakistan national, Minal Khan, married to Munir Khan, a CRPF man and resident of Gharota in Jammu, has been directed to leave. The duo had met online and performed a virtual nikah in March this year. "The bride was staying back on a short visa that expired on March 22," a local said.

In Kashmir, there are growing concerns among the wives of former militants who accompanied them to the Valley from PoK under the rehabilitation policy rolled out by the Omar Abdullah government in 2010. Official figures suggest that around 350 women and children used the Nepal route to return to Kashmir along with their husbands under the policy.

Muhammad Aslam, 53, a resident of north Kashmir's Bandipora district, married Shazia Aslam, 48, in 1999 in PoK and returned with her in 2010. "We have three children. How can they live without their mother if she is sent back?" he told *The Hindu*. "Where will she go in PoK? Who will take care of her? She was in fact not granted visa when her parents passed away," he said.

**'Reconsider decision'**

"Many affected are women who came to India 30-40 years ago, married Indian citizens, raised families, and have long been part of our society. This would not only be inhumane but would inflict deep emotional and physical distress on families who now know no other home. We urge the government to reconsider this decision, and adopt a compassionate approach regarding women, children and the elderly," said Peoples Democratic Party president Mehbooba Mufti.

A High Court judgment issued in 1971 had observed that no repatriation exercise could take place for such couples because "one person had merely travelled from one part of India to another".

### Background

- In 2010, the **Omar Abdullah-led J&K government**, with the backing of the Union Government, launched a **rehabilitation policy** for former Kashmiri militants who had crossed into Pakistan/PoK but wanted to return to normal life in India.
- Many such returnees entered via Nepal and other unofficial routes with their **Pakistani wives**, and began families in Kashmir.
- Now, in the current security climate, **over 150 such women face possible deportation** or repatriation, despite living in India for over a decade.

### Constitutional and Legal Dimensions

- **Right to Life under Article 21**: Deportation of women who are now integral parts of Indian families may violate their right to life and dignity.
- **Humanitarian concerns**: Many of these women have raised children, integrated socially, and have no present links with Pakistan or PoK.
- **Judicial precedent**: A 1971 High Court ruling had stated that such movement from PoK to J&K does not amount to foreign migration as PoK is legally Indian territory.

### Social and Ethical Issues

- Deporting such women would lead to **family fragmentation**, especially where children are Indian citizens.
- It raises **questions of gender justice**, as women are being penalized for the past choices of their husbands.
- These families have already endured social and political trauma. Forcible removal can cause **psychological and emotional distress**.

## Security vs. Humanity Dilemma

- **Security agencies argue** that unverified returnees from PoK may pose a risk post the Pahalgam attack.
- However, **not all individuals** pose threats — especially those integrated into Indian civil society for decades.
- A **blanket repatriation order may punish innocents**, weakening the credibility of India's rehabilitation and peace-building initiatives.

## Political Reactions

- **PDP president Mehbooba Mufti** and other regional leaders have termed the move inhumane and emotionally damaging.
- They have called for **reassessment of the decision**, especially in cases involving women, children, and elderly returnees.

## Way Forward

- **Case-by-case assessment** rather than mass deportation, based on individual background, threat assessment, and family situation.
- Establish a **legal mechanism** to provide citizenship or long-term visas to women married to Indian citizens and living in India for years.
- Align the approach with **international human rights standards** and India's commitment to inclusive and humanitarian governance.
- Enhance **border policy clarity** to prevent future confusion over unofficial routes and eligibility under rehabilitation schemes.

## UPSC Mains Practice Question

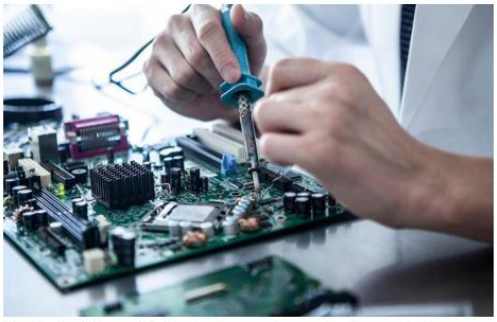
**Ques :**The repatriation of foreign spouses of ex-militants in Jammu & Kashmir raises critical questions about the balance between national security and humanitarian obligations. Discuss the constitutional, legal, and ethical implications of such a move.

A recent study commissioned by the **Office of the Principal Scientific Adviser** and conducted by **CII and CTIER** has highlighted structural weaknesses in India's publicly funded R&D institutions in supporting innovation, particularly **deep tech start-ups**.

# Insufficient support for deep tech start-ups in India: study

The study asked labs to supply data on 62 parameters such as their spend on R&D; around 25% of the participating institutions reported spending between 75% and 100% of their budget on R&D

Jacob Koshy
NEW DELHI



Only half of the public-funded research organisations in India opened their facilities to outside scholars. GETTY IMAGES/ISTOCKPHOTO

Only about one in four public-funded research and development organisations in India gives incubation support to start-ups and only one in six provides support to 'deep tech' start-ups. Only 15% collaborated with industry overseas and only half opened their facilities to outside researchers and students, say the findings of a study commissioned by the Office of the Principal Scientific Adviser and executed by the Confederation of Indian Industry (CII) and the Centre for Technology, Innovation, and Economic Research.

The study, via a detailed questionnaire, asked labs to rate themselves and supply data on 62 parameters such as their spend on R&D; the number of young scientists, patents filed, and technologies developed; and participation of women scientists and their contribution to "national missions" such as the Deep Ocean Mission and National Quantum Mission.

Labs of the "strategic sector", such as those belonging to defence, space, and atomic energy research – all of which constitute the lion's share of India's overall Research and Development (R&D) spend – were excluded from the study due to the "sensitive nature of their work".

The labs studied were those affiliated to the Council of Scientific and Industrial Research, the Department of Science and Technology, the Ministry of Electronics and Information Technology, and so on.

The Union government expenditure on R&D was around ₹55,685 crore in 2020-21, the figure cited in the study and the latest available says. Excluding the expenditure of the strategic departments such as the DRDO (defence), DAE (atomic energy) and DoS (space), the spending by key scientific agencies and other Central government departments was ₹24,587 crore.

Around 25% of the participating institutions reported spending between 75% and 100% of their budget on R&D.

The organisations that reported less than the median share of spending on R&D and S&T (Science and Technology) in the overall budget were largely from ICAR (Agricultural research), CSIR, ICMR (medical research), Ministry of AYUSH (Ayurveda and traditional medicine) and DST (Science and Technology).

**Staff strength down**

A large number of labs/institutes reported a decrease in the number of permanent staff in 2022-23 compared with the previous year and an increased reliance on contractual staff.

The median share of young researchers increased in 2022-23 to around 58% from 54% in the previous year.

"This is the second time that we have had such an analysis. What we intend is that the data from such a study be closely analysed by institutions so that they can identify areas of improvement," said Dr. Ajay Sood, Principal Scientific Adviser. "Overall, several research institutes seem to have oriented themselves from being centres of scientific inquiry to innovation centres. I see that as a positive development. Academia and product innovation must go hand in hand."

As part of its recommendation, the report advocates that every lab should be "mandated to review their existing mandates".

## Key Findings of the Study

- **Only 1 in 4 labs** offers incubation support to start-ups.
- **Only 1 in 6 labs** supports *deep tech* start-ups.
- Just **15% of labs** collaborate with international industry partners.
- **Only 50%** open facilities to external researchers and students.
- Strategic sector labs (defence, space, atomic energy) were **excluded** from the survey due to the sensitive nature of their work.

## Financial and Staffing Issues

- **R&D Budget (2020-21)**: ₹55,685 crore (overall); ₹24,587 crore excluding strategic sectors.
- About **25% of institutions** spent 75–100% of their budgets on R&D; others had lower allocations.
- Key departments with lower R&D spends: ICAR, CSIR, ICMR, Ministry of AYUSH, and DST.
- **Staffing Trends**:
  - Permanent staff declined.
  - Increased dependence on **contractual staff**.
  - Median proportion of **young researchers increased** to 58%.

## Governance and Policy Concerns

- The study reveals that many public R&D institutions **lack strategic alignment** with emerging national priorities (e.g., Deep Ocean Mission, Quantum Mission).
- There is a **disconnect between academia and industry**.
- Most institutions **do not function as innovation hubs** or actively nurture start-up ecosystems.
- Absence of regular **mandate reviews** makes institutions stagnant and risk-averse.

## Ethical and Developmental Implications

- Exclusion of external researchers and start-ups **limits knowledge democratization**.
- Heavy contractual staffing may affect **research continuity and job security** for young scientists.
- Lack of deep tech support hinders **strategic self-reliance**, especially in areas like AI, quantum computing, semiconductors, etc.

## Way Forward / Recommendations

- **Mandate institutional reviews** every 3–5 years to align missions with national priorities.
- Make **collaboration with start-ups and industries compulsory** for publicly funded labs.
- Offer **funding incentives based on innovation output** (patents, start-ups, prototypes).

- Create a **centralised national innovation registry** to track lab performance.
- Encourage **international cooperation** in deep tech through public-private partnerships.

## Conclusion

India's ambition to become a global science and technology leader needs more than just funding — it demands **agile, open, and collaborative R&D institutions**. The current inertia in public labs risks underutilizing the country's scientific talent and undermining start-up innovation, particularly in deep tech.

### UPSC Prelims Practice Question

**Ques : With reference to deep tech start-ups in India, consider the following statements:**

1. Deep tech start-ups are primarily based on breakthrough innovations in science and engineering.

2. A majority of public-funded R&D labs in India currently support incubation of deep tech start-ups.

3. Strategic sector labs such as those under DRDO and ISRO actively participated in the recent survey on R&D support.

**Which of the above statements is/are correct?**

a) 1 only

b) 1 and 2 only

c) 2 and 3 only

d) 1, 2 and 3

**Ans : a)**

### UPSC Mains Practice Question

**Ques :** Deep tech start-ups are crucial for India's strategic autonomy and future economy, but they suffer from institutional neglect.Discuss the role of R&D labs in supporting deep tech, and suggest measures to strengthen the link between public research and entrepreneurship.**(250 Words)**

Recent scientific research has proposed a **new behavioural model of locust swarming**, rejecting older assumptions that treated them as mindless particles. The new model highlights **cognitive decision-making based on visual perception**, offering a major shift in understanding how swarms behave — with direct implications for **climate adaptation, agriculture, and disaster preparedness**.

# New model finds locusts making complex decisions in deadly swarms

In a new study, researchers have proposed a model to make sense of locust swarms in terms of a cognitive decision-making process based on each locust's perception of nearby motion; the finding marks a major shift in how scientists understand behaviour of locusts and their ability to make swarm-related predictions

Monika Mondal
NEW DELHI

In late 2019, a wave of billions of desert locusts flew into western India through Pakistan. Their journey had already spanned several thousand kilometers since they first erupted in the arid plains of East Africa.

Locusts are grasshoppers that, in the right conditions, multiply rapidly. They grow larger and change colour in response to their environment. In a process called gregarisation, they transition from solitary creatures to a swarm, congregating in large numbers and travelling together over several leagues at a time.

Historically, these 'outbreaks' have led to widespread famine and economic devastation, earning them the name "locust plagues".

The 2019-2022 outbreak was the worst to hit Kenya in 70 years and to hit Ethiopia, Somalia, and India in 25 years. More than two lakh hectares of crops were destroyed.

At this time, researchers in German and North American universities saw an opportunity to study locust swarms and flew to Kenya, hoping to refine a long-standing theory about swarming behaviour.

Previous models of locust swarms have treated them like gases in motion. Specifically, they assumed individual locusts aligned with their neighbours like self-propelled particles – a model-object used in theoretical physics.

"Initially, we wanted to replicate what we thought we knew," Iain Couzin, director of the Max Planck Institute of Animal Behavior and professor at the University of Konstanz, who has studied collective intelligence and locust behaviour for over two decades, said. "But what we didn't expect was to find that we could not replicate our previous findings, and that completely changed our understanding of how locusts form these massive swarms."

In a recent paper, Mr. Couzin and his team proposed a revised model to make sense of swarms. According to this model, locusts don't behave like gases. Instead, their movement is based on a cognitive decision-making process based on their perception of nearby motion.

The finding marks a major shift in how scientists understand locust behaviour and their ability to make swarm-related predictions. As climate change continues to alter locusts' breeding patterns, this refined understanding may be the key to protecting crops, and livelihoods, before the next swarm arrives.

## From field to holograms

Just before the spread of COVID-19 became a pandemic, some members of the research team (other than Couzin) conducted a study in Kenya's Samburu and Isiolo counties. They examined large, ground-marching bands of young locusts using precise tracking methods, and noticed a pattern. The locusts weren't explicitly aligning with their immediate neighbours, contrary to what the self-propelled particles model predicted.

To test their observations, they conducted sensory-deprivation experiments in which they altered the insects' ability to see, smell or sense movement.

The results revealed that vision had a major influence in determining how locusts moved within a swarm. Locusts that couldn't see clearly lost their sense of direction while those with intact vision moved with the swarm even without physical contact.

"Those data showed that olfaction wasn't important, tactile cues weren't important, but vision was really, really important," Mr. Couzin said. "That justified the use of holographic virtual reality to study this phenomenon in more detail."

The scientists placed locusts in a fully immersive virtual-reality environment and tested their response to different visual stimuli. In these experiments, the locusts interacted with computer-generated swarms that varied in density and movement order. Soon, their key finding emerged: coherence of motion rather than crowding controlled their alignment. Even in sparsely populated swarms, the locusts moved together if their visual cues were strong.

The team realised locusts weren't behaving like gas particles. Instead, their movement followed a decision-making process based on their perception of nearby motion.

**In a first:** A farmer watches swarms of desert locusts that invaded his farm in Elburgon, Kenya, March 17, 2021. AP

> We thought we had a good understanding, and the old models were being used to try to make predictions, but that was the wrong way of thinking
>
> **IAIN COUZIN**
> Director of the Max Planck Institute of Animal Behavior

To represent this, the researchers developed a new mathematical model based on a neural ring attractor network, a concept in neuroscience. Instead of treating locusts as mindless particles, the approach addressed them as decision-making entities that could integrate multiple visual inputs before choosing a direction.

The model suggested locusts may weigh different potential options and make effective decisions. "However, at the group level, there's no planning at all," Mr. Couzin added. "The group is an emergent phenomenon."

An emergent phenomenon is a complex pattern arising from simple interactions, without central control. In locust swarms, collective movement emerges from each locust's individual behaviour, creating large, coordinated swarms without a leader. This is how flocks of birds and traffic jams work, too.

"This study established how swarms move and how coordinated motion arises," Sercan Sayin, neurologist and molecular biologist at the University of Konstanz and one of the study's authors, said. "The initial direction selection and how this is maintained – that's the next question we would like to answer."

Understanding how locusts move has real-world consequences. Yet how these groups emerge or which exact factors determine the direction of their flight remains unclear.

## Climate change

Climate change has worsened the problem by increasing rainfall in desert regions, creating ideal breeding conditions. The 2019-2022 outbreak – one of the worst in decades – was fuelled by unusually strong monsoons and cyclones in the Arabian Sea. Cyclones Mekunu and Luban had also struck the Arabian Peninsula in 2018. Unusual monsoons and delayed control worsened the crisis, creating a swarm.

"We thought we had a good understanding, and the old models were being used to try to make predictions, but that was the wrong way of thinking," Mr. Couzin said. "Hopefully, now we've set the record straight and we can start building a team effort to make increasingly accurate predictions. One way to do that, of course, is to start tracking animals in the wild."

"With the changing climate, the swarms are expected to become larger and more unpredictable, making management more difficult," he added. "To really be able to make predictive models or understand this better, we need much more research. We also need to involve climate scientists and vegetation experts."

*(Monika Mondal is a freelance science and environment journalist. a.monikamondal@gmail.com)*

## THE GIST

- Locusts are grasshoppers that, in the right conditions, multiply rapidly. They grow larger and change colour in response to their environment
- In a process called gregarisation, they transition from solitary creatures to a swarm, congregating in large numbers and travelling together over several leagues at a time
- Historically, these 'outbreaks' have led to widespread famine and economic devastation, earning them the name "locust plagues"

## Key Highlights of the Research

- Earlier models treated locusts as **self-propelled particles** aligning with nearby individuals — like gas molecules.
- The new model, based on **neural ring attractor networks**, shows locusts behave as **decision-making agents**, especially influenced by **vision**.
- **Tactile and olfactory cues** were found to be less important.
- The research used **virtual reality** to simulate locust behaviour under different visual conditions.
- **Swarms form as an emergent phenomenon**, meaning complex movement arises from individual decision-making, without central leadership.

## Real-World Implications for India

- The **2019–2022 locust outbreak** was the worst in decades, affecting India, Kenya, Ethiopia, and Somalia.
- **Over 2 lakh hectares of crops** were destroyed in India.
- The spread was linked to **climate change**, particularly increased rainfall and cyclones in desert regions like the Arabian Peninsula.
- Predicting swarm movement based on the **new model** could improve **early warning systems** and **agricultural protection**.

## Climate Change Linkage

- Climate change is creating **favourable breeding grounds** due to:
  - Increased rainfall in deserts
  - Stronger monsoon patterns
  - More frequent cyclones
- Result: **Larger, more unpredictable, and more destructive swarms**.

## Prelims Pointers

- **Gregarisation**: Process by which solitary locusts transform into swarming forms.
- **Neural Ring Attractor Network**: Neuroscience-based model used to simulate decision-making in locusts.
- **Vision-based behaviour**: Vision, not touch or smell, is the primary factor influencing movement in swarms.

- **Emergent Phenomenon**: Collective movement arises from individual behaviour without central control.
- **Climate factors**: Cyclones Mekunu and Luban, delayed monsoons, and excessive rains contributed to the 2019-2022 outbreak.

## UPSC Prelims Practice Question

**Ques : Which of the following statements best describes the process of gregarisation in locusts?**

a) Genetic mutation that occurs in high-altitude desert locusts

b) A viral disease that affects locusts and causes them to move in groups

c) A behavioural shift where solitary locusts transform into swarming forms

d) A type of breeding technique adopted for locust control

**Ans : c)**

## UPSC Mains Practice Question

**Ques :** The understanding of locust swarming behaviour through decision-making models represents a major breakthrough in agricultural disaster prediction. Discuss how this scientific advancement can aid India's preparedness against pest outbreaks in the context of climate change. **(250 Words)**

## Page 09 : GS 3 : Environment

As India accelerates its development and faces increasing climate risks, expanding tree cover and carbon sequestration have emerged as critical strategies to meet environmental, economic, and global trade obligations. The article underscores the multifaceted benefits of afforestation, agroforestry, and carbon credit mechanisms, particularly in light of India's **net-zero target by 2070**.

# *Expanding tree cover is crucial*

**B.B.L. Madhukar**

Chairman, FORE School of Management, and Director General, BRICS Chamber of Commerce and Industry

As climate change accelerates, tree plantation and carbon sequestration are essential for environmental sustainability. For India, a rapidly growing economy reliant on carbon-intensive industries, expanding tree cover is crucial for mitigating climate change while supporting industrial growth and rural livelihoods.

India's forest and tree cover is 25.17%, significantly below the 33% target set by the National Forest Policy of 1988. This shortfall has serious implications, as deforestation, rapid urbanisation, and industrial emissions continue to degrade ecosystems.

**Accelerating afforestation**

Tree plantations act as natural carbon sinks, absorbing and storing atmospheric carbon dioxide ($CO_2$). However, in India, this sequestration potential needs to be enhanced through large-scale afforestation programmes. Beyond reducing greenhouse gas emissions, increased tree cover improves soil health, recharges groundwater, retains water, reduces soil erosion, and enhances resilience against extreme weather events.

Recognising this, India has introduced several policies and initiatives to accelerate afforestation efforts. The National Agroforestry Policy (2014) and the Trees Outside Forests in India Program encourage private landowners, farmers, and industries to participate in large-scale tree planting. They aim to reduce dependence on natural forests for timber and fuelwood, restore degraded ecosystems, and provide additional income sources for rural communities.

The Green India Mission, part of the National Action Plan on Climate Change, has been instrumental in reviving degraded forests and promoting sustainable forest management. According to government data, GIM has helped increase forest cover by 0.56% between 2017 and 2021.

As India strives to achieve net-zero emissions by 2070, tree plantations and carbon sequestration will be key pillars of its sustainability strategy

Corporate social responsibility initiatives have also contributed to large-scale tree plantation drives. Companies in sectors such as automobile manufacturing, cement, and energy have undertaken afforestation projects to offset emissions. Many corporations are also integrating afforestation efforts into their carbon credit strategies, allowing them to claim emission reductions while restoring ecosystems.

Indian industries face growing pressure to reduce their carbon footprint due to stringent international regulations. The European Union's Carbon Border Adjustment Mechanism, set to be enforced in 2026, will impose tariffs on carbon-intensive imports such as steel, cement, and aluminium. As trade between India and the EU reached €124 billion in 2023, these tariffs could greatly impact Indian exporters.

To remain competitive in global markets, industries are increasingly investing in carbon-offset projects, including large-scale tree plantations. Such investments help companies align with global sustainability standards, earn carbon credits under frameworks such as the Verified Carbon Standard and Clean Development Mechanism, and offset emissions in a cost-effective manner instead of purchasing expensive international carbon credits.

Sustainability is no longer about regulatory compliance – it has become a strategic advantage. Companies are integrating sustainability into their operations by developing green supply chains, sourcing raw materials from sustainable forestry projects, and implementing energy-efficient manufacturing processes. With global capital markets increasingly favouring environmental, social, and governance principles, Indian industries must adapt to maintain their market position.

Tree plantations also offer economic and social benefits. Large-scale afforestation initiatives create millions of jobs, especially in nursery management, forest conservation, and agroforestry. These are particularly vital for rural communities. Agroforestry, which integrates trees into agricultural systems, is a particularly promising approach. It enhances soil fertility by improving nutrient cycling, provides additional income from timber, fruits, and medicinal plants, and increases resilience to droughts and erratic weather conditions. A study by the Indian Council of Agricultural Research found that agroforestry can increase farm incomes by 20-30%.

To support community-led afforestation, government and non-governmental organisations have stepped in to provide financial incentives, training and capacity-building programmes to educate farmers and rural workers, and market linkages to help communities sell forest-based products. These foster a sense of responsibility and ownership.

**Policy recommendations**

Despite its benefits, large-scale tree plantation faces several challenges. One is the rising cost of carbon credits. In 2023, the average price of carbon credits under the EU Emissions Trading System was €83 per tonne of $CO_2$. For Indian businesses, investing in afforestation offers a more cost-effective solution than purchasing expensive carbon credits from international markets. Another challenge is the absence of a robust carbon trading policy in India. To fully capitalise on global carbon markets, India must establish a transparent national carbon credit registry, a well-defined regulatory framework under Article 6 of the Paris Agreement, and financial incentives to encourage private-sector investments in afforestation.

As India strives to achieve net-zero emissions by 2070, tree plantations and carbon sequestration will be key pillars of its sustainability strategy. The risks of inaction are too high.

## Key Concerns and Current Status

- **India's forest and tree cover** is **25.17%**, below the **33% target** of the National Forest Policy, 1988.
- Rapid urbanisation, deforestation, and carbon-intensive industries have **degraded ecosystems** and increased emissions.
- India's growth in industries like cement, steel, and energy is under scrutiny due to **upcoming international carbon regulations**.

## Benefits of Expanding Tree Cover

1. **Carbon Sequestration**: Trees act as **natural carbon sinks**, absorbing atmospheric $CO_2$ and mitigating climate change.
2. **Environmental Stability**: Improves **soil fertility**, **groundwater recharge**, reduces erosion, and enhances **climate resilience**.
3. **Livelihood Generation**: Creates jobs in **nursery management**, **agroforestry**, and **sustainable harvesting** of forest products.
4. **Agroforestry Advantage**: Increases farm income by 20–30% (ICAR study); integrates trees into farming for higher productivity and resilience.
5. **Climate Adaptation**: Strengthens India's capacity to adapt to **extreme weather events** and ecosystem degradation.

## Key Government and Private Initiatives

- **National Agroforestry Policy (2014)**: Promotes tree plantation on private lands, reduces pressure on natural forests.
- **Green India Mission (GIM)**: Part of NAPCC, contributed a **0.56% increase in forest cover** from 2017 to 2021.
- **Trees Outside Forests in India (TOFI)**: Collaborative initiative to promote community and private afforestation.
- **CSR and Industry Role**: Indian companies are linking afforestation to **carbon credit** generation and **ESG strategies**.

## International Trade Implication

- The **EU's Carbon Border Adjustment Mechanism (CBAM)**, effective from 2026, will tax **carbon-intensive imports**.
- Indian exporters in **steel, cement, aluminium** face tariff threats unless they **offset emissions** or meet **green standards**.

- Tree plantations offer a **cost-effective domestic alternative** to expensive **EU carbon credits (€83/tonne $CO_2$ in 2023)**.

## Challenges in Implementation

- **High cost and volatility of carbon credits** in global markets.
- Lack of a **national carbon trading registry** and **policy framework** for private participation.
- Need for better **community engagement**, **market access**, and **financial incentives**.

## UPSC Prelims Pointers

- **National Forest Policy Target (1988)**: 33% forest and tree cover
- **Current Status**: 25.17%
- **National Agroforestry Policy**: Launched in 2014
- **Green India Mission**: Part of NAPCC
- **EU CBAM**: Imposes tariffs on carbon-intensive imports (from 2026)
- **Carbon Sequestration**: Natural process of capturing and storing atmospheric $CO_2$

## UPSC Mains Practice Question

**Ques :***Expanding tree cover in India is not only an ecological necessity but also a strategic economic response to global climate regulations. Critically examine the role of afforestation, agroforestry, and carbon markets in India's climate policy.*

**Special 301 Report**: Released annually by the U.S. Trade Representative (USTR), it identifies countries that do not provide adequate protection or enforcement of intellectual property (IP) rights.

# U.S. puts India back on IPR watch list

Over the past year, India has remained inconsistent in its progress on intellectual property protection and enforcement despite efforts to strengthen its IP regime, according to the U.S. Trade Representative's 2025 Special 301 report

**Press Trust of India**
NEW DELHI

The U.S. on Tuesday again placed India on its 'priority watch list' stating that New Delhi remains one of the world's most challenging major economies with respect to protection and enforcement of intellectual property (IP) rights.

The US Trade Representative's (USTR) 2025 Special 301 report said that over the past year, India has remained inconsistent in its progress on intellectual property protection and enforcement. It said that although India has worked to strengthen its IP regime, there continues to be a lack of progress on many long-standing IP concerns.

It added that patent issues continue to be of particular concern in India.

Stakeholders continue to express concerns over vagueness in the interpretation of the Indian Patents Act, it alleged. "While steps to improve IP Office operations and procedures are to be commended, India's overall IP enforcement remains inadequate," it said.

China, Indonesia, Russia, Argentina, and Venezuela are among others on the list. It has also placed 25 countries, including Pakistan and Turkey, on the list. India maintains high customs duties directed to IP-intensive products such as information and communications technology (ICT) products, solar energy equipment, medical devices, pharmaceuticals, and capital goods. Furthermore, stakeholders have reported continuing problems with unauthorised file sharing of video games, signal theft by cable operators, commercial-scale photocopying and unauthorised reprints of academic books, and circumvention of technological protection measures.

Companies also continue to face uncertainty due to insufficient legal means to protect trade secrets in India. These concerns could factor into the Trump administration's negotiations with many countries over tariffs and non-tariff barriers, giving the report greater significance this year.

*(With inputs from M. Soundariya Preetha in Coimbatore)*

### Whither safety

India remains one of the most challenging major economies with regard to protection and enforcement of IP, the USTR report says


- The report says patent issues continue to be of particular concern in India
- Stakeholders have reported unauthorised file sharing of video games, reprints of academic books, among other issues
- Companies also face uncertainty due to insufficient legal means to protect trade secrets in India

- **Priority Watch List**: India has been placed again on this list in the 2025 report.
- **Main Allegations on India**:
  - Lack of progress on long-standing IP concerns
  - Patent law interpretation is vague
  - High customs duties on IP-intensive products like ICT, pharma, and medical devices
  - Rampant piracy, signal theft, photocopying of books, and tech protection circumvention
  - Weak protection of trade secrets
- **Other countries on the list**: China, Russia, Indonesia, Argentina, Venezuela, etc.

## Key Issues Raised:

1. **IPR Enforcement in India**:
   - India has a National IPR Policy (2016), but implementation and enforcement gaps remain.
   - The U.S. particularly objects to Section 3(d) of India's Patent Act — which prevents "evergreening" of patents by pharma companies.

2. **India vs. U.S. – Divergent Approaches**:
    - India prioritizes **public health** and **access to affordable medicines** (using TRIPS flexibilities like compulsory licensing).
    - The U.S. demands a stricter, market-friendly IP regime aligned with Western standards.
3. **India's Standpoint**:
    - India complies with WTO's TRIPS agreement.
    - India has improved IP office functioning, trademark processing, GI tagging, etc., but struggles with piracy and trade secret laws.
4. **Sovereign Policy vs. External Pressure**:
    - India needs to balance **innovation and public welfare**.
    - Strong IPR is essential for "Make in India", "Digital India", and "Startup India" missions.

Way Forward**:**

- Clarify patent law interpretation through judiciary or guidelines.
- Enact a specific **Trade Secret Protection Law**.
- Strengthen state-level IP cells for better enforcement.
- Curb piracy and digital content theft using tech and legal measures.
- Continue diplomatic dialogue while protecting national interest.

## UPSC PrelimsPractice Question

**Ques :** *Which of the following statements is/are correct regarding the Special 301 Report?*

*1. It is released annually by the World Intellectual Property Organization (WIPO).*

*2. It identifies countries with inadequate protection or enforcement of Intellectual Property Rights (IPRs).*

*3. India has never been placed on the Priority Watch List under this report.*

*Select the correct answer using the codes below:*

*a) 1 and 2 only*

*b) 2 only*

*c) 1 and 3 only*

*d) 1, 2 and 3*

*Ans : b)*

## UPSC Mains Practice Question

*Ques : India's intellectual property regime strives to protect public health while promoting innovation, but enforcement and legal gaps remain key challenges." Examine in light of the 2025 Special 301 Report.*

# A powerful judicial remedy for waste management

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Continuing mandamus could be the way forward to combat India's giant waste management problem

India is the biggest plastic polluter in the world, according to a new study published in Nature, releasing 9.3 million tonnes (Mt) annually. This is equivalent to around a fifth of global plastic emission. Plastic emissions, according to this study, are defined as material (which includes both debris and open plastic burning) that has moved from managed or mismanaged systems (in which waste is subject to a form of control, however basic contained state) to the unmanaged system (the environment; uncontained state) with no control.

**Evidence of an underestimation**

The report goes on to say that India reports that its dumpsites (uncontrolled land disposal) outnumber sanitary landfills by 10:1 and, despite the claim that there is a national collection coverage of 95%, there is evidence that official statistics do not include rural areas, open burning of uncollected waste or waste recycled by the informal sector. This means that India's official plastic waste generation rate (approximately 0.12 kilograms per capita per day (kg $cap^{-1}$ $day^{-1}$) is probably underestimated and waste collection overestimated. According to this study, the plastic waste generation rate for India of 0.54 kg $cap^{-1}$ $day^{-1}$.

The alarming situation *vis-à-vis* plastic waste in the Indian Himalayan Region was highlighted in an Opinion page article in this daily, "Mountains of plastic are choking the Himalayan States" (March 4, 2024). A salient point was the lack of data regarding the quantum and the quality of waste and the capacity to deal with plastic waste in this region.

Waste generation data regarding the total solid waste and plastic waste in the country is given in the Central Pollution Control Board's annual reports on implementation of Solid Waste Management Rules 2016 and based on data supplied by State Pollution Control Boards (SPCB) or Pollution Control Committees (PCC). In turn, these are based on data supplied by the municipal bodies in the respective States/Union Territories. There is nothing in any of the reports regarding the methodology adopted by SPCBs or PCCs or municipal bodies or any waste audit which explains how the figures have been arrived at. It is important that the methodology employed by whatever agency that is gathering the data is put out in the public domain and faces third party scrutiny so that the systems we create or propose to create for waste management are commensurate with the quantity and the nature of the waste that needs managing and processing. There is no accounting of waste being generated in rural India it seems, which comes under panchayati raj institutions, and also for a vast stretch of the country which does not come under the jurisdiction of any institutions of local self-governance.

The Supreme Court of India has observed that environmental protection is not only a regulatory obligation but also a constitutional imperative aimed at safeguarding the fundamental rights of individuals and preserving ecological balance.

There is an urgent need that we have cogent, reliable data about waste generation and its composition in the country. We also need to have data regarding the infrastructure that the country has built over the years to deal with the management and processing of this waste. This infrastructure could be geotagged to help in tracking. Every local government, whether in an urban or in rural area (they are the pivot of waste management as in the legal mandate in the country), has to be mandatorily linked with a material recovery facility (MRF), recyclers of various waste streams, extended producer responsibility (EPR) kiosks and sanitary landfills.

To operationalise EPR, all producers, importers, and brand owners (PIBOs) that have a legal obligation collectively can form kiosks across the country to gather waste from all local bodies. These kiosks could be set up depending on the quantum of waste expected, the geography of the area, and ease of access to these kiosks and other relevant factors. This is so that every urban and rural local body in the country has easy access to these kiosks where all waste that is covered under EPR can be deposited. PIBOs can employ people to segregate their waste at such kiosks so that various segments of waste can be taken care of according to the mandate of the law. This is not a simple exercise. But it is not not impossible either if there is a plan.

We need to know how much waste is being generated where and how it is being managed. As India is a technology powerhouse, it is time that we leverage this to solve our problems and set an example for the world.

**Court verdict on tanneries**

On January 31, a Division Bench of the Supreme Court gave a very heartening verdict in the form of continuing mandamus to ensure that the pollution caused by tanneries in Vellore of Tamil Nadu is reversed by employing necessary remediation programmes. The Court has constituted a committee that needs to report in four months on the compliance of the order. The Court itself has justified the need to ensure compliance. The Bench said, 'violations occur while various Supreme Court directives and environmental norms are flouted, and the schemes or plans framed by the Government remain on paper, failing to achieve any meaningful results. Thus, this Court, being the custodian of fundamental rights, must come to the rescue of the affected individuals/families and ensure that persistent wrongs are rectified and justice is actually done'.

It is absolutely imperative that constitutional courts in India adopt this approach and deal with matters of waste management in the same spirit. Justice will only be done in these matters when compliance with orders is ensured in a time-bound manner.

**Focus on the polluter**

The Court in the same matter reiterated that "the polluter pays principle" casts absolute liability on the polluter for the harm caused to the environment and extends not only to compensate the victims of pollution but also the cost of restoring the environmental degradation. Remediation of the damaged environment is part of the process of sustainable development, and such a polluter is liable to pay the cost to the individual sufferers as well as the cost of reversing damaged ecology. The Court has held that when there is a violation in compliance with the environmental laws (be it a result of engaging in activities directly involved in causing pollution or from a failure to take steps to curb pollution and restore the environment or violating any terms of licence granted by any State or central authority and acts detrimental to the environment, the effect of which causes or is likely to cause degradation of the environment), then the deeming fiction of polluting the environment becomes applicable. The polluter is not only liable to payment of compensation but has also to restore the environment.

Therefore, while the liability is clear, the process of determining an equitable compensation amount is fraught with challenges, as it must account for both the tangible and intangible damage inflicted on the environment and the affected communities. In this matter the Court applied the Government Pay Principle, and it is for the government to pay compensation to the affected individuals/families and recover the same from the polluters, until the damage caused to the ecology is fully reversed.

It is time that the waste management system in the country is also held accountable to millions whose health is impacted by the land, water and air pollution caused by unmanaged and mismanaged waste all across the country .

In fact, continuing mandamus could be the way forward to deal with pressing environmental issues to ensure compliance.

**Paper 03:Environment**

**UPSC Mains Practice Question:Judicial activism in the form of continuing mandamus can be a powerful tool to enforce environmental compliance in India's broken waste management system. Critically examine the potential and limitations of such an approach.(250 words)**

## Context :

India has emerged as the world's largest plastic polluter, contributing around **9.3 million tonnes of plastic waste annually**, as per a recent study in *Nature*. Despite regulatory frameworks like the **Solid Waste Management Rules, 2016** and Extended Producer Responsibility (EPR), ground realities reflect **underreporting, ineffective enforcement, and poor data integrity** — especially in rural India.

### Key Findings and Concerns

- India generates **about 0.54 kg of plastic waste per capita per day**, contrary to the official figure of 0.12 kg — indicating severe underestimation.
- **Dumpsites outnumber sanitary landfills 10:1**; official data excludes rural waste and informal recycling.
- There is **no standardized methodology or third-party audit** of waste data collected by municipal bodies or State Pollution Control Boards.
- **Rural areas and Panchayati Raj institutions** lack structured waste data and management systems.

### Judicial Intervention and Supreme Court's Role

- The **Supreme Court's January 31 judgment** (regarding tanneries in Vellore) set a strong precedent by:
  - Issuing a **continuing mandamus** for sustained monitoring of pollution control.
  - Emphasizing the **"polluter pays" principle**, making violators liable for ecological restoration and victim compensation.
  - Ordering **government compensation first**, with the **right to recover** from polluters — ensuring relief is not delayed.

This approach can be **replicated for solid and plastic waste management** cases, where violations often continue unchecked and regulatory orders are ignored.

## Need for Structural Reform in Waste Governance

- India lacks **reliable, disaggregated data** on the quantity, composition, and geographical spread of waste.
- The infrastructure to manage waste (MRFs, sanitary landfills, EPR kiosks, etc.) is **inadequate or poorly linked** to local bodies.
- EPR (Extended Producer Responsibility) remains largely **theoretical** without on-ground collection systems by Producers, Importers, and Brand Owners (PIBOs).
- There is **minimal technological integration** (e.g., geotagging, real-time tracking) in waste monitoring, despite India's technological potential.

## Way Forward: Legal, Institutional and Technological Measures

- **Mandate waste data transparency** with standardised methodologies and third-party audits.
- **Geotag and digitise waste infrastructure** to improve traceability and planning.
- Institutionalise **continuing mandamus** for ongoing environmental violations to ensure compliance, not just judgments on paper.
- Expand EPR coverage by setting up **collection kiosks** in both urban and rural local bodies.
- Ensure PIBOs are legally bound to **collect, segregate, and dispose** waste under EPR in coordination with local authorities.

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