NITIN SIR CLASSES

THE HINDU
INDIA'S NATIONAL NEWSPAPER SINCE 1878

Daily News Analysis

The Hindu Important News Articles & Editorial For UPSC CSE

Wednesday, 12 Nov , 2025

Edition : International Table of Contents

Daily News Analysis

Page 05 : GS 3 : Internal Security/ Prelims

A recent terror incident in New Delhi, near the Red Fort, has highlighted the expanding footprint and evolving nature of terrorism in India. The arrest of three doctors and five other individuals linked to Jaish-e-Mohammad (JeM) and Ansar Ghazwat-ul-Hind (AGuH) underscores how educated professionals and urban networks are being exploited to create sleeper cells outside traditional conflict zones like Jammu & Kashmir.

This case not only raises concerns about internal security but also demonstrates the shift from conventional militancy to covert urban radicalisation.

NITIN SIR CLASSES

THE HINDU
INDIA'S NATIONAL NEWSPAPER SINCE 1878

Daily News Analysis

Woman doctor arrested in J&K terror module case linked to Delhi car blast

Five arrested in Kashmir Valley; three doctors, all working at Al Falah University, were arrested from Faridabad in Haryana and Saharanpur in Uttar Pradesh between October 30 and November 8; officials say doctors were trying to create a base for the terror group outside the Kashmir Valley

Vijaita Singh
NEW DELHI

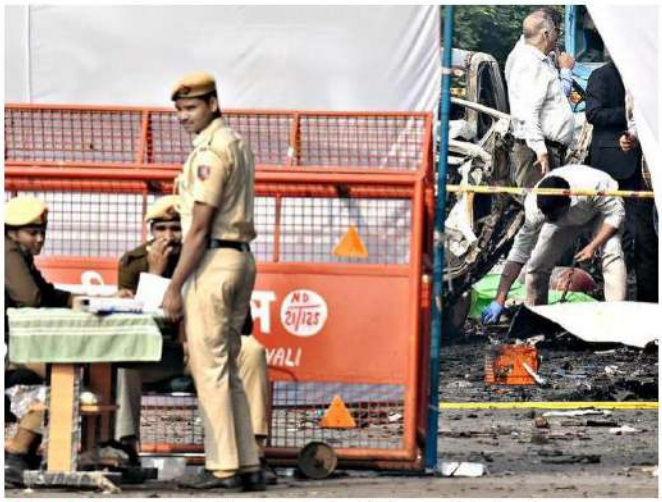
The Red Fort car explosion was preceded by a 20-day probe by the Jammu and Kashmir (J&K) Police to find a "terror module" linked to two terror outfits: Jaish-e-Mohammad (JeM) and Ansar Ghazwat-ul-Hind (AguH).

While the JeM is a Pakistan-based terror organisation, AguH, the Indian cell of the global terror outfit Al Qaeda, was founded by Zakir Musa, who was killed in an encounter with security forces in 2019.

On Tuesday, a J&K Police source said a woman identified as Shaheen Saeed (40) had been arrested in the case, making her the eighth accused in the case. At least 20 more are being questioned.

Began with a pamphlet

As reported, a pamphlet that surfaced in Srinagar on October 19, asking the local people not to cooperate with the police and refuse them entry in their shops, led the police to a cleric in Shopian which unravelled the alleged terror plot and led to the discovery of 2,900 kg of explosive substances and sophisticated weapons during raids in Faridabad on November 9 and 10 (Sunday and Monday). The blast in the national capital took place on Monday.



Alert mode: Police personnel and those from other investigative agencies deployed in an area cordoned off after the blast near the Red Fort in New Delhi, on Tuesday. SHASHI SHEKHAR KASHYAP

While five arrests were made in the Kashmir Valley, three doctors, all working at Al Falah University in Faridabad, were arrested from the Haryana city and Saharanpur in Uttar Pradesh between October 30 and November 8. They included Dr. Shaheen.

The other two doctors are Muzammil Ahmad Ganaie (32) from Pulwama and Adeel, a resident of Wanpora, Kulgam.

Ferrying explosives

On Dr. Shaheen's role, a government source said, "It was from her car that we seized an assault rifle. She is a close friend of Dr. Muzammil and she knew her car was being used to ferry explosives." Dr. Shaheen is a resident of Lucknow.

The source said that the doctors were allegedly trying to create a base for the terror group outside the Kashmir Valley.

"We had no idea about the enormity of the case. After the cleric's arrest, we recovered sophisticated weapons at the instance of the accused. It was only after the 2,900 kg of explosives were seized in Faridabad that the intensity of the attack could be understood. A bulk of the explosives was seized on November 10 from the home of Mohammad Ishtiyaq, a resident of Mewat in Haryana who was working as a cleric at Al Falah college," the source said.

Earlier, 350 kg of ammonium nitrate was seized from the rented home of Dr. Muzammil.

Home Minister Amit Shah chaired a review meeting on the Delhi car blast with the senior officials.

"Instructed them to hunt down each and every culprit behind this incident. Everyone involved in this act will face the full wrath of our agencies," said Mr. Shah on X.

Current Developments

- The J&K Police, in coordination with national intelligence agencies, unearthed a terror module active across J&K, Haryana, and Uttar Pradesh.
- The probe began after a pamphlet in Srinagar (October 19) urged locals not to cooperate with police — leading investigators to a cleric in Shopian, which uncovered a larger terror network.
- Major recoveries:
  - 2,900 kg of explosives (ammonium nitrate and others)
  - Sophisticated weapons
  - Seizures made from Faridabad, Mewat, and Saharanpur.

- Arrests: 8 individuals including three doctors working at Al Falah University, Faridabad — Dr. Shaheen Saeed (Lucknow), Dr. Muzammil Ahmad (Pulwama), and Dr. Adeel (Kulgam).
- Their alleged role: ferrying explosives, providing logistical support, and creating a base for JeM and AGuH outside Kashmir.
- The Union Home Minister chaired a high-level security meeting, directing agencies to bring all accused to justice.

Static Linkages for UPSC

1. India's Internal Security Architecture

- India's internal security setup involves coordination between Central and State agencies, including:
  - NIA (National Investigation Agency) – handles terror-related cases.
  - IB (Intelligence Bureau) – collects and shares intelligence.
  - State Police and ATS – handle local enforcement.
  - NSG (National Security Guard) – response to terror attacks.

This case demonstrates effective multi-agency coordination and intelligence-based policing, essential for counter-terror operations.

2. Urban Terrorism & Radicalisation

- The trend of urban radicalisation—where educated youth or professionals are indoctrinated via online propaganda—is a major security concern.
- Groups like AGuH, linked to Al-Qaeda, exploit social media and religious narratives for recruitment and indoctrination.
- Such incidents show a shift from traditional militancy in border areas to covert urban networks—posing a greater challenge for intelligence agencies.

3. Legal & Policy Framework

- Unlawful Activities (Prevention) Act (UAPA), 1967 – primary anti-terror law allowing investigation, arrest, and proscription of terror groups.
- National Investigation Agency (NIA) Act, 2008 – empowers NIA to investigate inter-state and cross-border terrorism.
- Arms Act, Explosives Act, IT Act – invoked for possession, use, or dissemination of illegal arms and digital propaganda.

The Delhi blast case is likely to be handled under these legislations.

4. Counter-Terrorism Strategy

India follows a four-pronged counter-terrorism strategy:

1. Prevention – through intelligence and surveillance.
2. Detection – inter-agency coordination and forensic capability.
3. Response – special forces (NSG, NIA).
4. Rehabilitation and De-radicalisation – through community policing and education.

The present case stresses the importance of early detection and deradicalisation mechanisms to prevent educated youth from being exploited.

Broader Implications

1. Expanding terror networks beyond J&K: The discovery of explosives in Haryana and UP reveals efforts to decentralise terror operations.
2. Use of professionals and academia: The involvement of doctors indicates a new phase of radicalisation where extremist ideology penetrates mainstream professions.
3. National security alert: The proximity of the attack to Red Fort—a national symbol—was likely meant to send a symbolic message.
4. Need for counter-narratives: India's counter-terror efforts must include digital counter-radicalisation programs and community engagement.

Conclusion

The J&K terror module linked to the Delhi Red Fort blast is a stark reminder that terrorism in India is evolving in form and geography. As terror outfits shift from traditional insurgency to network-based urban cells, India's security strategy must move towards intelligence fusion, technological surveillance, and de-radicalisation initiatives.

Maintaining a balance between national security and civil liberties will be crucial as India strengthens its counter-terror framework to prevent such incidents in the future.

Daily News Analysis

UPSC Prelims Practice Question

Ques: With reference to the recent Delhi blast near Red Fort, consider the following statements:

1. The National Security Guard (NSG) is the nodal agency for forensic analysis of explosive materials in India.

2. The National Investigation Agency (NIA) can take up cases of terrorism that have inter-State or international links without the consent of the State government.

3. Ammonium nitrate, often used in improvised explosive devices (IEDs), is classified as an explosive under Indian law.

Which of the statements given above are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

Ans: a)

UPSC Mains Practice Question

Ques: The recent high-intensity explosion near Delhi's Red Fort and the simultaneous busting of a terror module in Jammu and Kashmir highlight the evolving nature of terrorism in India. Discuss the major challenges in India's counterterrorism strategy and suggest measures to strengthen national security. **(150 Words)**

Daily News Analysis

Page 06 : GS 3 : Environment / Prelims

At the 30th Conference of Parties (COP30) to the UNFCCC, held in Belem, Brazil (2025), India reiterated that the global climate framework must continue to uphold the equity-based principles enshrined in the Paris Agreement (2015).

India emphasized that COP30 should not be used to alter the "architecture" of the Paris Deal, which is rooted in Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) — a fundamental principle ensuring fairness between developed and developing countries.

Daily News Analysis

Don't use COP30 to change Paris deal 'architecture': India

Country says the parties 'must remain committed to and guided by equity'; it urges the Brazil COP Presidency to make a special call to the Parties to submit their National Adaptation Plan

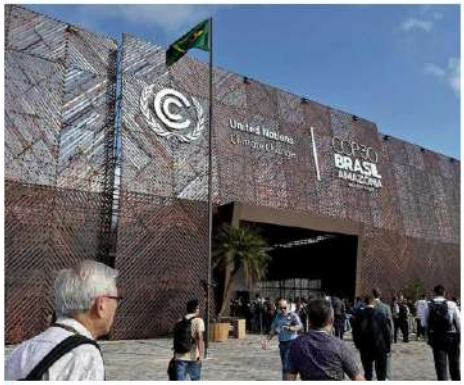
Jacob Koshy
NEW DELHI

India made its opening statement at COP30 in Belem, Brazil, underlining that the climate conference ought to be stressing "adaptation", and the 10th anniversary of the Paris Agreement, signed in 2015, should not be used to "change the architecture" of that consensus.

This "architecture" refers to the agreed-upon principle of "common but differentiated responsibilities (CBDR)", which means that all countries must do their bit to curb fossil fuel emissions but without compromising on national economic-development priorities.

Dwindling finance

With the withdrawal of the United States from the Paris Agreement and developed countries agreeing to mobilise only $300 billion – and not the demanded $1.35 trillion annually – by 2035 as "climate finance" (to cope with unfolding climate disasters as well as move away from fossil fuels), developing countries, including India, saw this as a reneging on agreed commitments.



Common cause: Attendees walking in front of the main entrance to the COP30 UN Climate Change Conference in Belem, Brazil. AFP

"We must remain committed to and guided by equity and common but differentiated responsibilities. The cornerstone principles of the Convention and its Paris Agreement signed all of us to the CBDR in Brazil back in 1992. We must reaffirm our strongest commitment to the principles here, not attempt to sideline and ignore them," India delegation member Suman Chandra said as part of a collective of Like-Minded Developing Countries (LMDC) on Tuesday.

'Architecture' refers to the principle of 'common but differentiated responsibilities'

"Over the next two weeks, we must stay true to the cause and advance adaptation, which is among the most important issues for us. The [Brazil COP] Presidency must make a special call to the Parties to submit their National Adaptation Plan in line with national priorities and progress," she added.

The LMDC is a large collective that represents nearly half of the world's population, and consists of China, India, Pakistan, Indonesia, Bangladesh, Cuba, Egypt and several others.

India is yet to submit its National Adaptation Plan and the updated Nationally Determined Contribution, which specifies steps to curb fossil fuel emission by 2035, to the United Nations.

"We are not here to point fingers, but the facts speak for themselves. We cannot simply bypass the roadblocks and the impediments to implementation," Ms. Chandra added.

"Developed countries need to reach net zero much earlier than projected. They should invest significantly more in negative emission technologies," Tanmay Kumar, Secretary, Environment Ministry and part of the India delegation, said on behalf of a joint statement by another grouping called BASIC (Brazil India China South Africa). The LMDC had pushed for including a discussion on the responsibility of developed countries on the COP30 agenda but in the larger spirit of "consensus" was moved to a separate negotiating track by COP30 President André Corrêa do Lago.

Background: The Paris Agreement (2015) "Architecture"

- The Paris Agreement, adopted at COP21 (Paris, 2015), is built on:
    1. CBDR-RC – All nations act against climate change, but responsibilities differ based on historical emissions and development levels.

2. Nationally Determined Contributions (NDCs) – Each country voluntarily submits emission-reduction and adaptation goals.
3. Climate Finance Commitment – Developed nations pledged $100 billion per year by 2020, later extended with higher targets.
4. Equity and Flexibility – Developing countries receive support for technology and finance to meet their NDCs.

India's Key Points at COP30

1. Preserve the Core Principles

- India cautioned against any attempt to "restructure" the Paris framework under the guise of a new agenda.
- It reaffirmed commitment to equity, CBDR, and national sovereignty in policy-making.

"We must remain committed to and guided by equity and common but differentiated responsibilities… not attempt to sideline or ignore them." – India's delegation at COP30.

2. Focus on Adaptation

- India urged COP30 to emphasize climate adaptation — the process of adjusting to the effects of climate change — which is crucial for developing nations facing droughts, floods, and heatwaves.
- It called on the Brazil Presidency to encourage countries to submit their National Adaptation Plans (NAPs) aligned with national priorities.
- India itself is yet to submit its updated National Adaptation Plan and revised NDC (2035).

3. Climate Finance Concerns

- Developed countries have fallen short on promised funding:
  - Only $300 billion committed by 2035, versus the $1.35 trillion demanded annually by developing nations.
  - India termed this a "reneging" on commitments, affecting implementation of mitigation and adaptation measures.

4. Role of Developed Nations

- India (with BASIC countries — Brazil, South Africa, China, India) demanded that developed nations:
  - Achieve net-zero emissions earlier than 2050.
  - Invest in negative emission technologies (like carbon capture, direct air removal).

- The Like-Minded Developing Countries (LMDC) group — which includes India, China, Pakistan, Egypt, Indonesia, etc. — jointly pushed for a stronger accountability mechanism for developed nations.

Static Linkages for UPSC

Common but Differentiated Responsibilities (CBDR)

- Introduced in the Rio Earth Summit (1992) under the UNFCCC, CBDR acknowledges that:
  - Developed nations have historical responsibility for emissions.
  - Developing nations require developmental space and support to grow sustainably.

Climate Finance & Technology Transfer

- Developing countries depend on financial and technological support for renewable energy, adaptation, and resilience-building.
- Instruments:
  - Green Climate Fund (GCF)
  - Adaptation Fund
  - Technology Mechanism under UNFCCC

India's Climate Strategy

- **NDC Targets (updated 2022):**
  - Reduce emissions intensity of GDP by 45% by 2030 (from 2005 levels).
  - Achieve 50% cumulative electric power capacity from non-fossil sources by 2030.
  - Achieve Net Zero by 2070.
- Key Missions: National Solar Mission, National Hydrogen Mission, and National Adaptation Fund for Climate Change.

Challenges Highlighted

1. Inequitable burden-sharing: Developed nations continue high emissions while demanding deeper cuts from developing nations.
2. Inadequate climate finance: The shortfall affects renewable energy transition and resilience building.
3. Shift from adaptation to mitigation focus: Developing countries argue that adaptation — not just emission cuts — must remain central.
4. Technological barriers: Limited access to clean technology due to intellectual property rights.

Conclusion

Daily News Analysis

- India's stand at COP30 reinforces its long-standing position that climate justice and equity must remain the foundation of global climate action.
- While the world celebrates the 10th anniversary of the Paris Agreement, India warns that diluting CBDR principles or shifting responsibility to developing nations would undermine trust and collective progress.
- To ensure sustainable outcomes, developed nations must deliver on finance, technology, and early net-zero timelines, while developing countries like India continue their balanced approach toward growth with green responsibility.

UPSC Prelims Practice Question

Ques : **The term "Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC)", often mentioned in climate change negotiations, is associated with which of the following agreements?**

(A) Kyoto Protocol

(B) Paris Agreement

(C) Montreal Protocol

(D) Cartagena Protocol

Ans : b)

UPSC Mains Practice Question

Ques : The outcomes of COP30 highlight growing tensions between developed and developing countries over climate responsibility. Discuss India's stance on preserving the Paris Agreement architecture and the challenges in ensuring climate equity. **(150 Words)**

Daily News Analysis

Page : 07 : GS 2 : Social Justice

Stress is the body's natural "fight-or-flight" mechanism, meant for survival. However, prolonged or traumatic stress can over-activate neural circuits that regulate fear, leading to maladaptive behaviours such as anxiety, phobias, or **Post-Traumatic Stress Disorder (PTSD)**.

A new study by scientists from the **University of Texas at Austin** and **University of California, Los Angeles (UCLA)** has identified the **paraventricular thalamus (PVT)** as a key brain region linking **stress** to **enhanced unlearned fear responses**.

Daily News Analysis

Scientists map neural pathway linking stress to enhanced fears

Stress's benefits for the species come at the cost of long-term changes in defensive responses; for instance, it can exaggerate how you respond to a threat; if someone were attacked in a dark street, they could become afraid of any dark environment, like in movie theatres. This is called stress-enhanced fear learning

Reeteka Sud

In every living being through history, stress from a perceived threat has automatically and immediately triggered an avalanche of reactions.

'Fight or flight' is an example of the choices these life-forms have confronted. Every bodily function that is not essential for survival is moved to the sidelines as the being prepares to respond. All available resources are diverted to extricating oneself from the threatening situation. In this sense, stress has been good for the body and for the species.

Fear response

But it comes at a cost. Stress can also cause long term changes in defensive responses. For starters, it can exaggerate how you respond to a threat. If someone were attacked in a dark street, they could become afraid of any dark environment, like in movie theatres. This is called stress-enhanced fear learning.

Stress can also induce a fear of objects and situations unrelated to the original threat. This is called a stress-enhanced fear response (SEFR).

SEFR has been connected to anxiety disorders, phobias, and post-traumatic stress disorder (PTSD). The question of why this connection exists recently prompted scientists at the University of Texas, Austin, and the University of California, Los Angeles, to closely investigate it in a mouse model.

They found that they were able to induce SEFR in the mice when they were confronted with new cues unrelated to a stressor. This then prompted the team to design careful experiments to identify the precise brain regions and mechanisms driving such behaviour, paving the way for better clinical treatments for conditions like PTSD.

Experimental setup

The team confined lab mice in a conditioning chamber, an aluminium box with a clear door and about a foot long on each side. The control group animals were undisturbed while the stress group was administered a mild electrical footshock (1 mA) at random intervals.

Then the team gave the mice context exposure: the two groups were placed in the same chamber but received no footshock this time. For mice that had received the shocks earlier in a similar chamber, their surroundings sufficed to trigger a freeze response, i.e., they became completely immobile yet hyper-alert.

Freezing is not a conscious choice and happens automatically.

Out in the wild, mice are prey animals, so their self-preservation repertoire includes freezing, fleeing, and simply hoping to avoid detection (e.g., from a predator flying overhead). In the conditioning chamber, the confinement only induced the freeze response.

Next, the team placed these mice in a different chamber, i.e. exposed them to a new context, where they received new stimuli in the form of brief sounds. Even here, the mice displayed a heightened freeze response – an example of unlearned fear and thus of SEFR at work.

Curiously, the stress group mice froze only after they heard the audio tones, not otherwise. It was a sign that the stress mice hadn't generalised the freeze response.

Follow the light

How does the brain develop unlearned fear?

The scientists peered into the brains of the stress group mice looking for a particular protein called c-fos. This protein is the "time to get to work" signal for brain cells. They found a part of a brain region called the paraventricular thalamus (PVT) expressing high amounts of c-fos after the audiotone test, but only in mice that received both the footshock on day 1 and the audio tone test later.

If the animals had not faced the footshocks on day 1 or had received the shocks but no audio tone test after, the amounts of c-fos didn't change. In other words, increases in c-fos in the PVT were specific to the unlearned fear response.

Learned fear behaviour allows us to respond appropriately to cues, but stressful or traumatic experiences can ratchet this response up in response to both learned and unlearned fears, as with PTSD. ABBRAR SALAZAR/UNSPLASH

Freezing isn't a conscious choice and happens automatically. In the wild, mice are prey, so their self-preservation repertoire includes freezing and fleeing. In the conditioning chamber, the confinement only induced the freeze response

The PVT is named thus because it is a part of the thalamus and is localised around ("para") the third ventricle, one of the cavities inside the brain. The thalamus is a somewhat egg-shaped structure located roughly at the middle of the brain. All information coming into the brain first comes here and is then relayed to other regions for interpretation and response.

The research team suspected that the unlearned fear response stemmed from the PVT being activated, and sought a way to confirm this independently.

When the cells in any brain region prepare to act, they use calcium ions to signal to their neighbours to get ready. So the team injected a calcium-sensing protein genetically modified to light up when it detected calcium. Their observations confirmed that neurons in a part of the PVT were getting activated when the unlearned fear response was on show.

They also showed that when the activity in these neurons was blocked, the stress group mice did not develop the freezing response when exposed to the audio tones.

Remarkably, however, this blocking action didn't change the stress-enhanced fear learning in these mice, proving that the activation of PVT neurons was specific to SEFR.

When more is too much

The experiments by the international team showed that unlearned fear is caused by increased activity in PVT neurons. This is why the team's study is fascinating: the findings highlight that PVT fine-tunes different defensive responses differently.

For example, learned fear behaviour is adaptive, allowing us to respond appropriately to environmental cues. But stressful or traumatic experiences can ratchet this response up manifold in response to both learned, like in the dark movie theatre, and unlearned fears, as with PTSD.

In fact, unlearned fear responses have been particularly difficult to treat because scientists did not fully understand their causes. The new finding, of specific activity in the PVT neurons, may now lead them to new avenues to clinically treat symptoms.

(Reeteka Sud is a neuroscientist by training and senior scientist at the Centre for Brain and Mind, Department of Psychiatry, NIMHANS, Bengaluru. reeteka@gmail.com)

THE GIST

Fight or flight exemplifies the stress response. Every bodily function not linked to survival is moved to the sidelines. All available resources are diverted to extricating oneself from the threatening situation. In this sense, stress has been good for the body and the species

SEFR has been connected to anxiety disorders, phobias, and PTSD. Scientists were able to induce SEFR in mice and design experiments to identify the brain regions driving such behaviour, paving the way for better treatments for conditions like PTSD

Observations confirmed that neurons in the PVT activated when the unlearned fear response manifested. When it was blocked, the stress group didn't develop the freezing response. However, this blocking action didn't change SEFR, proving that activation of PVT neurons was specific to SEFR

Key Findings

1. **Stress-Enhanced Fear Learning (SEFL):**
    - Refers to exaggerated defensive behaviour after a stressful or traumatic experience.
    - Example: after an attack in a dark alley, a person becomes fearful of all dark places.
2. **Experiment on Mice:**

- Mice were given mild shocks (stress group) and later exposed to new harmless cues (sounds).
- Even without further shocks, stressed mice froze upon hearing tones — a **stress-enhanced fear response (SEFR)**, showing fear of unlearned cues.

3. **Role of Paraventricular Thalamus (PVT):**
   - Scientists observed high levels of **c-fos** (a marker of neuronal activation) in PVT neurons during SEFR.
   - Using calcium-sensing proteins, they confirmed that PVT neurons activate specifically during **unlearned fear**.
   - When PVT activity was blocked, the unlearned fear response disappeared — confirming its causal role.
4. **Differentiation:**
   - **Learned Fear** (adaptive): fear of known danger cues, helps survival.
   - **Unlearned Fear** (maladaptive): fear of unrelated cues due to over-activation of stress circuits — hallmark of PTSD.

Scientific Significance

- **First mapping of a distinct neural pathway** that translates stress into exaggerated fear.
- Opens avenues for **targeted therapies** — drugs or neuro-modulation to reduce abnormal PVT activity in PTSD and anxiety.
- Provides a **mechanistic understanding** of how chronic stress reshapes brain function.

Static Linkages for UPSC

1. Brain Regions Involved in Fear and Stress

Region	Function
Amygdala	Primary fear-processing centre

Region	Function
Hippocampus	Contextual memory of fear
Prefrontal Cortex	Regulates emotional response
Paraventricular Thalamus (PVT)	Newly identified relay linking stress to unlearned fear

2. Hormonal Mechanisms

- Stress triggers the **Hypothalamic-Pituitary-Adrenal (HPA) axis** → release of **cortisol** → long-term changes in neuronal activity and memory.

3. Health Policy Link

- India's **National Mental Health Programme (NMHP)** and **Tele-MANAS initiative** focus on early detection of trauma-related disorders.
- Research like this aids in **scientific basis for mental-health interventions** and destigmatisation of PTSD.

Broader Implications

1. **For Neuroscience:** Reveals that stress can selectively enhance *unlearned* fear circuits, guiding precision psychiatry.
2. **For Medicine:** May help design drugs that calm PVT over-activation without dulling normal fear learning.
3. **For Society:** Understanding neural roots of PTSD can improve **rehabilitation of trauma victims**, soldiers, and disaster survivors.

Conclusion

The discovery of the PVT-mediated neural pathway linking stress and fear offers critical insight into how traumatic experiences reshape brain function.

- While stress is evolutionarily beneficial, its chronic over-activation can distort fear perception, resulting in disorders like PTSD.

- Future therapies that modulate specific brain circuits rather than general sedation could transform the treatment of anxiety and trauma-related illnesses.

UPSC Mains Practice Question

Ques : Discuss the recent neuroscientific advances in understanding the link between stress and fear learning. How can such findings aid in the management of post-traumatic stress disorder (PTSD)? **(250 Words)**

Daily News Analysis

Page 09 : GS 3 : Environment / Prelims

According to The Hindu Data Team (2025), India recorded the largest absolute increase in greenhouse gas (GHG) emissions among all countries in 2024. While India became the third-largest emitter globally (after China and the U.S.), its per capita emissions remained less than half the global average, reaffirming the country's long-standing argument for climate equity and differentiated responsibility.

NITIN SIR CLASSES

THE HINDU
INDIA'S NATIONAL NEWSPAPER SINCE 1878

Daily News Analysis

What's the status of the rare earth hypothesis?

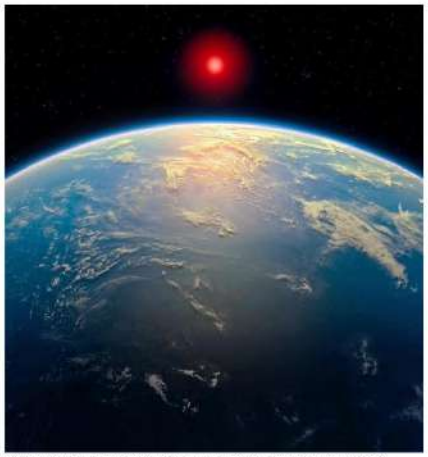
Findings from the Kepler and James Webb Space Telescope suggest that while earth-sized planets in habitable zones are not as rare as once thought, the conditions necessary for complex life may still be uncommon

Vasudevan Mukunth

The rare earth hypothesis was proposed in a 2000 book by palaeontologist Peter Ward and astronomer Donald Brownlee. It argues that while simple, microbial life may be common in the universe, complex, multicellular life is likely uncommon. The idea is rooted in a particular place in the universe meeting a chain of successive conditions.

While we often talk about life as ranging from simple (e.g. bacteria and yeast) to complex (e.g. humans and octopuses), life itself is a complex phenomenon and the product of many factors falling in place. Studying these factors on the earth itself has been an arduous and even now an unfinished task; and looking for them on planets located several light years away remains extraordinarily fraught. Scientists studying the possibility of life on other planets have busied themselves with particular aspects over time. Some focus on planetary ingredients such as a rocky world with surface water in the habitable zone of the host star. Other scientists have been concerned with system-level architectures such as giant planets in particular places in the universe. Still others have been looking into long-term climate regulation and a persistent atmosphere. And so on.

Since 2000, we have accumulated significantly more data about exoplanets and planetary science. And the big picture that has emerged is mixed: several conditions required for life look less restrictive than scientists once feared whereas many others look harder to meet than scientists had hoped.



An illustration which shows a hycean world — an exoplanet with a liquid water ocean beneath a hydrogen-rich atmosphere — orbiting a red dwarf star. REUTERS

Understanding a planet

Let's consider how often potentially habitable earth-sized planets occur. Studies based on early data from the NASA Kepler telescope (2009-2018) suggested that a significant fraction of sun-like stars in the Milky Way galaxy hosts small planets receiving starlight comparable to what the earth receives. One study even found that roughly a fifth of sun-like stars may harbour earth-sized planets in their habitable zones, although the data had many uncertainties.

More recent work has concluded, based on Kepler data, that there's a non-negligible rate at which rocky planets occur in the habitable zones of stars called GK dwarfs. These and similar findings have concluded that worlds of roughly the right size at roughly the right distance from a suitable star are not rare, thus weakening the most sweeping claim in the hypothesis. The question has thus shifted from 'where a planet is' to 'what a planet is like'. In the solar system, Mercury is too close to the sun to host earth-like life whereas Pluto is too far away. But while both the earth and Venus are in the sun's habitable zone, Venus's atmosphere renders it deadly for earth-like life.

One important open issue is whether small planets around cool, active M-dwarf stars can retain their atmospheres and surface water over billions of years. Modelling studies have indicated that planets that spend millions of years exposed to intense stellar radiation – like that M-dwarf stars are known to emit – tend to lose water and build up false-positive oxygen atmospheres.

Say intense ultraviolet radiation from an M-dwarf star breaks up water molecules on the planet: $H_2O \rightarrow H^+ + OH^-$. Further breakdown leads to O and H atoms accumulating in the atmosphere. Over time, the H escapes to space more easily than O, and the O atoms left behind pair up to form O_2. If there aren't enough surface 'sinks' that can absorb this oxygen fast enough – the way rocks and oceans do on the earth – the O_2 will accumulate. When a telescope looks at this planet and finds an excess of oxygen in its atmosphere, scientists may think the planet's surface has photosynthesis, which is how the earth's atmosphere has lots of oxygen. But it's actually due to the M-dwarf star's radiation.

On the other hand, some planets around M-dwarf stars can keep their air for a long time, even if most can't. If the star's magnetic outflows – streams of charged particles blown off the star by its magnetic field – are weak or shaped in such a way that they don't hit the planet hard, and if the planet is farther out and cooler, its atmosphere will be eroded more slowly. A strong planetary magnetic field can also deflect a part of the stellar wind, while a massive planet with ongoing volcanic activity can replace some of the lost gases.

These are all system-specific conditions that require a specific mix of star activity, magnetic fields, orbit, planet mass, rotation, and internal heat. When they line up well, a planet can retain its atmosphere for billions of years. However, such planets are in the minority because M-dwarf stars often produce strong flares and many close-in planets lack strong magnetic shields.

Scientists can directly test these observations today. Using NASA's James Webb Space Telescope (JWST), astronomers have started measuring the heat emitted from nearby rocky exoplanets. In TRAPPIST-1c, which is located near the inner edge of its system's habitable zone 40.7 lightyears away, the JWST has ruled out a thick atmosphere rich in carbon dioxide. Previously, scientists using JWST data had also found that the innermost planet, TRAPPIST-1b, likely lacked a substantial atmosphere.

These are only two worlds in one system, yet they show that earth-sized isn't synonymous with earth-like. Scientists still need more measurements of cooler, more temperate planets to understand how often atmospheres survive where earth-like life could plausibly persist.

Climate stabilisation

Another pillar of the rare earth hypothesis is long-term climate stabilisation. On the earth, the weathering of continental rocks and the recycling of carbon between the earth's interior and the atmosphere have buffered the climate over geologic time. Many researchers have linked this buffering to plate tectonics, which subduct a carbonated crust and build new surface rocks. This said, the interiors of planets behave in different ways. Rocky planets can have one stiff shell that barely moves, long quiet times broken by short bursts of crust movement or plate-like tectonics (as on the earth). A planet can even switch between these modes over time. Some models also show that without modern plate tectonics, a planet might still keep a habitable climate by balancing volcanism (which adds gases), weathering (removes gases), burial (traps materials), and crustal foundering (sinks the crust). Scientists don't have consensus either: while plate tectonics could help maintain a stable climate that in turn can support complex life, it may not be strictly required for life to begin.

The role of giants

A third line of debate is the role of giant planets like Jupiter. The old intuition was that Jupiter 'shields' the earth by deflecting comets and asteroids. Subsequent studies have complicated this story, however. Depending on a giant planet's mass and orbit, scientists have found that it can reduce or increase the flux of impactors to the inner system and it can also deliver water-rich bodies early on. In other words, there seems to be no universal 'filter' on this front; it all depends on the system's architecture. This conclusion has weakened the claim that a Jupiter-like planet is a necessary precondition for complex life on a rocky planet in the same system.

Thus, on the question of finding small, temperate planets, many scientists today argue that the occurrence rate of earth-sized planets in the habitable zones of sun-like stars is non-zero and may be a few tens of percent, per Kepler data, depending on the definitions and extrapolations. That undermines the notion that the earth's basic orbital and size configuration is vanishingly uncommon. On the other hand, on the question of planets' ability to retain atmospheres, have long climate cycles, be able to avoid catastrophic events, and so on, the data has become more sobering. The results keep open the possibility that truly earth-like surface environments supporting complex biospheres are less common than the count of earth-sized planets in the habitable zone would suggest.

Not definitive

Two more threads bear on the rare versus common debate. First, a recent effort to place an upper limit on the number of earth-like planets emphasised that a lot hinges on atmospheric processes that scientists can't yet survey at scale. Second, searches for technosignatures – signs of technology made by extra-terrestrial life, especially things nature is unlikely to produce on its own – have sharpened the limits on the prevalence of civilisations whose activities emit radio waves (such 'radio-loud' activities on the earth include broadcasting for TV and radio and air traffic control). Multi-year surveys of thousands of stars by the Breakthrough Listen project haven't found any convincing signals so far. While not detecting something doesn't prove that it's absent, it sets upper limits on how common it could be in the cosmos.

Taken together, the rare earth hypothesis remains plausible for complex life but it can't be said to be demonstrably true. At this juncture, three developments could change the picture: (i) if scientists detect atmospheres on rocky, temperate planets, preferably around sun-like stars, showing gases consistent with active surface water cycles; (ii) if scientists place stronger better constraints on tectonic regimes on exoplanets (even indirectly), indicating whether long-term climate stabilisers are widespread or rare; and (iii) scientists detect biosignatures or technosignatures. The first steps are already underway. Extremely large ground telescopes currently under construction as well as future space missions are aimed squarely at planets with temperate atmospheres.

Until their observations mature, however, a fair summary seems to be: while microbial life could be common, long-lived ecosystems straddling land and ocean and capable of producing complex life may still be scarce. This seems to be as far as the data can take us today.

Key Findings (2024 GHG Data)

Daily News Analysis

Indicator	Global	India	Remarks
Total Global GHG Emissions	57,700 $MtCO_2e$	—	Highest ever recorded
Increase over 2023	+1,500 $MtCO_2e$	+165 $MtCO_2e$	India contributed most to the rise
India's Rank (Total Emissions)	—	3rd (after China, U.S.)	Major emitter in absolute terms
Per Capita GHG Emissions	6.4 tCO_2e	3 tCO_2e	<50% of global average
Per Capita Growth (2023–24)	0.04%	3.7%	Rapid increase in developing economies

Sector-Wise Breakdown of Global Emissions (2024)

- Fossil CO_2 emissions (69%) – from coal, oil, and natural gas combustion.
    - Major contributors: Power generation, industry, transportation, fuel production.
- Methane (CH_4) – 16% – largely from agriculture (livestock, paddy) and waste management.
- Land-use change & deforestation – significant contributor to rising GHG levels.

India's Emission Context

1. Absolute vs. Relative Contribution
    - India's total emissions rose sharply due to industrial growth, urbanization, and energy demand.
    - However, India's per capita footprint remains low (3 tCO_2e vs. world avg 6.4), indicating low emission intensity per person.
2. Drivers of Increase
    - Coal-based power generation and transport energy demand surged post-pandemic recovery.
    - Expansion of manufacturing, steel, and cement sectors.
    - Urban waste and agricultural methane emissions rising with population growth.
3. Emission Efficiency
    - Despite growth, India's emission intensity of GDP has declined due to renewable energy expansion and energy efficiency measures.

Static Linkages for UPSC

1. India's Commitments under Paris Agreement

- NDC Targets (2022 update):
    - Reduce emissions intensity of GDP by 45% by 2030 (from 2005 levels).
    - Achieve 50% non-fossil power capacity by 2030.
    - Reach Net Zero by 2070.

Daily News Analysis

2. Major National Initiatives

- National Action Plan on Climate Change (NAPCC) – umbrella policy for mitigation/adaptation.
- Perform, Achieve, and Trade (PAT) Scheme – industrial energy efficiency.
- National Green Hydrogen Mission, International Solar Alliance (ISA) – global renewable leadership.
- Ujjwala Yojana and Faster Adoption of EVs (FAME) – sustainable transitions in energy use.

3. Emission Types

- CO_2 – from fossil fuels.
- CH_4 (Methane) – agriculture and waste.
- N_2O (Nitrous oxide) – fertilizers.
- F-gases – industrial refrigerants.

Analysis: India's Climate Dilemma

- Development vs. Decarbonization: India faces a twin challenge — expanding its economy while reducing emissions.
- Equity in Climate Action: India's per capita emissions being below half the world average strengthens its argument for "Common but Differentiated Responsibilities (CBDR)".
- Need for Climate Finance: Despite commitments, global finance flows remain inadequate (as highlighted at COP30).
- Sectoral Transition: The focus must shift to clean power, electric mobility, energy-efficient industries, and sustainable agriculture.

Conclusion

- India's 2024 emission data reflects its growing global economic weight and corresponding environmental responsibility.
- However, low per capita emissions and declining emission intensity demonstrate that India's growth remains comparatively sustainable.
- Going forward, the success of India's energy transition and climate finance access will determine whether it can balance developmental aspirations with climate leadership.

Daily News Analysis

Page 11 : GS 3 : Science & Technology

The Rare Earth Hypothesis, proposed by Peter Ward and Donald Brownlee (2000), argues that while simple microbial life may be widespread in the universe, complex multicellular life (like animals and humans) is likely exceptionally rare.

- It suggests that a long chain of planetary, chemical, and astronomical coincidences must align to produce a planet capable of sustaining complex, intelligent life — making Earth an extraordinary exception rather than a cosmic norm.
- In 2025, with fresh data from NASA's Kepler and James Webb Space Telescope (JWST), scientists have begun reassessing this hypothesis — and the emerging evidence paints a nuanced picture.

NITIN SIR CLASSES

THE HINDU
INDIA'S NATIONAL NEWSPAPER SINCE 1878

Daily News Analysis

What's the status of the rare earth hypothesis?

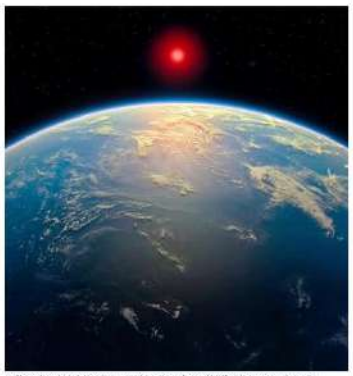
Findings from the Kepler and James Webb Space Telescope suggest that while earth-sized planets in habitable zones are not as rare as once thought, the conditions necessary for complex life may still be uncommon

Vasudevan Mukunth

The rare earth hypothesis was proposed in a 2000 book by palaeontologist Peter Ward and astronomer Donald Brownlee. It argues that while simple, microbial life may be common in the universe, complex, multicellular life is likely uncommon. The idea is rooted in a particular place in the universe meeting a chain of successive conditions.

While we often talk about life as ranging from simple (e.g. bacteria and yeast) to complex (e.g. humans and octopuses), life itself is a complex phenomenon and the product of many factors falling in place. Studying these factors on the earth itself has been an arduous and even now an unfinished task; and looking for them on planets located several light years away remains extraordinarily fraught. Scientists studying the possibility of life on other planets have busied themselves with particular aspects over time. Some focus on planetary ingredients such as a rocky world with surface water in the habitable zone of the host star. Other scientists have been concerned with system-level architectures such as giant planets in particular places in the universe. Still others have been looking into long-term climate regulation and a persistent atmosphere. And so on.

Since 2000, we have accumulated significantly more data about exoplanets and planetary science. And the big picture that has emerged is mixed: several conditions required for life look less restrictive than scientists once feared whereas many others look harder to meet than scientists had hoped.



An illustration which shows a hycean world — an exoplanet with a liquid water ocean beneath a hydrogen-rich atmosphere — orbiting a red dwarf star. NATURE

Understanding a planet

Let's consider how often potentially habitable earth-sized planets occur. Studies based on early data from the NASA Kepler telescope (2009-2018) suggested that a significant fraction of sun-like stars in the Milky Way galaxy hosts small planets receiving starlight comparable to what the earth receives. One study even found that roughly a fifth of sun-like stars may harbour earth-sized planets in their habitable zones, although the data had many uncertainties.

More recent work has concluded, based on Kepler data, that there's a non-negligible rate at which rocky planets occur in the habitable zones of stars called GK dwarfs. These and similar findings have concluded that worlds of roughly the right size at roughly the right distance from a suitable star are not rare, thus weakening the most sweeping claim in the hypothesis. The question has thus shifted from 'where a planet is' to 'what a planet is like'. In the solar system, Mercury is too close to the sun to host earth-like life whereas Pluto is too far away. But while both the earth and Venus are in the sun's habitable zone, Venus's atmosphere renders it deadly for earth-like life.

One important open issue is whether small planets around cool, active M-dwarf stars can retain their atmospheres and surface water over billions of years. Modelling studies have indicated that planets that spend millions of years exposed to intense stellar radiation – like the M-dwarf stars are known to emit – tend to lose water and build up false-positive oxygen atmospheres.

Say intense ultraviolet radiation from an M-dwarf star breaks up water molecules on the planet: $H_2O \rightarrow H_2 + O(\uparrow)$. Further breakdown leads to O and H atoms accumulating in the atmosphere. Over time, the H escapes to space more easily than O, and the O atoms left behind pair up to form O_2. If there aren't enough surface 'sinks' that can absorb this oxygen fast enough – the way rocks and oceans do on the earth – the O_2 will accumulate. When a telescope looks at this planet and finds an excess of oxygen in its atmosphere, scientists may think the planet's surface has photosynthesis, which is how the earth's atmosphere has lots of oxygen. But it's actually due to the M-dwarf star's radiation.

On the other hand, some planets around M-dwarf stars can keep their air for a long time, even if most can't. If the star's magnetic outflows – streams of charged particles blown off the star by its magnetic field – are weak or shaped in such a way that they don't hit the planet hard, and if the planet is farther out and cooler, its atmosphere will be eroded more slowly. A strong planetary magnetic field can also deflect a part of the stellar wind, while a massive planet with ongoing volcanic activity can replace some of the lost gases.

These are all system-specific conditions that require a specific mix of star activity, magnetic fields, orbit, planet mass, rotation, and internal heat. When they line up well, a planet can retain its atmosphere for billions of years. However, such planets are in the minority because M-dwarf stars often produce strong flares and many close-in planets lack strong magnetic shields.

Scientists can directly test these observations today. Using NASA's James Webb Space Telescope (JWST), astronomers have started measuring the heat emitted from nearby rocky exoplanets. In TRAPPIST-1c, which is located near the inner edge of its system's habitable zone 40.7 light years away, the JWST has ruled out a thick atmosphere rich in carbon dioxide. Previously, scientists using JWST data had also found that the innermost planet, TRAPPIST-1b, likely lacked a substantial atmosphere.

These are only two worlds in one system, yet they show that earth-sized isn't synonymous with earth-like. Scientists still need more measurements of cooler, more temperate planets to understand how often atmospheres survive where earth-like life could plausibly persist.

Climate stabilisation

Another pillar of the rare earth hypothesis is long-term climate stabilisation. On the earth, the weathering of continental rocks and the recycling of carbon between the earth's interior and the atmosphere have buffered the climate over geologic time. Many researchers have linked this buffering to plate tectonics, which subduct a carbonated crust and build new surface rocks. This said, the interiors of planets behave in different ways. Rocky planets can have one stiff shell that barely moves, long quiet times broken by short bursts of crust movement or plate-like tectonics (as on the earth). A planet can even switch between these modes over time. Some models also show that without modern plate tectonics, a planet might still keep a habitable climate by balancing volcanism (which adds gases), weathering (removes gases), burial (traps materials), and crustal foundering (sinks the crust).

Scientists don't have consensus either: while plate tectonics could help maintain a stable climate that in turn can support complex life, it may not be strictly required for life to begin.

The role of giants

A third line of debate is the role of giant planets like Jupiter. The old intuition was that Jupiter 'shields' the earth by deflecting comets and asteroids. Subsequent studies have complicated this story, however. Depending on a giant planet's mass and orbit, scientists have found that it can reduce or increase the flux of impactors to the inner system and it can also deliver water-rich bodies early on. In other words, there seems to be no universal 'filter' on this front; it all depends on the system's architecture. The conclusion has weakened the claim that a Jupiter-like planet is a necessary precondition for complex life on a rocky planet in the same system.

Thus, on the question of finding small, temperate planets, many scientists today argue that the occurrence rate of earth-sized planets in the habitable zones of sun-like stars is non-zero and may be a few tens of percent, per Kepler data, depending on the definitions and extrapolations. That underwrites the notion that the earth's basic orbital and star configuration is vanishingly uncommon. On the other hand, on the question of planets' ability to retain atmospheres, have long climate cycles, be able to avoid catastrophic events, and so on, the data has become more sobering. The results keep open the possibility that truly earth-like surface environments supporting complex biospheres are less common than the count of earth-sized planets in the habitable zone would suggest.

Not definitive

Two more threads bear on the rare versus common debate. First, a recent effort to place an upper limit on the number of earth-like planets emphasised that a lot hinges on atmospheric processes that scientists can't yet survey at scale. Second, searches for technosignatures – signs of technology made by extra-terrestrial life, especially things natures is unlikely to produce on its own – have sharpened the limits on the prevalence of civilisations whose activities emit radio waves (such 'radio-loud' activities on the earth include broadcasting for TV and radio and air traffic control). Multi-year surveys of thousands of stars by the Breakthrough Listen project haven't found any convincing signals so far. While not detecting something doesn't prove that it's absent, it sets upper limits on how common it could be in the cosmos.

Taken together, the rare earth hypothesis remains plausible for complex life but it can't be said to be demonstrably true. At this juncture, three developments could change the picture: (i) if scientists detect atmospheres on rocky, temperate planets, preferably around sun-like stars, showing gases consistent with active surface-water cycles; (ii) if scientists place stronger better constraints on tectonic regimes on exoplanets (even indirectly), indicating whether long-term climate stabilisers are widespread or rare; and (iii) scientists detect biosignatures or technosignatures. The first steps are already underway. Formerly large ground telescopes currently under construction as well as future space missions are aimed squarely at planets with temperate atmospheres.

Until their observations mature, however, a fair summary seems to be: while microbial life could be common, long-lived ecosystems straddling land and ocean and capable of producing complex life may still be scarce. This seems to be as far as the data can take us today.

Background: The Core Idea

The hypothesis rests on three broad pillars:

1. Planetary Factors – Earth's size, magnetic field, atmosphere, and plate tectonics.
2. Systemic Factors – A stable Sun, protective giant planets (like Jupiter), and orbital stability.
3. Temporal Stability – Billions of years of climate stability allowing evolution from microbes to complex life.

Ward and Brownlee claimed that this combination of factors is so improbable that Earth-like complexity may be unique or exceedingly rare in the universe.

New Findings (2020s Onwards)

1. Abundance of Earth-sized Planets (Kepler Data)

- Kepler (2009–2018) discovered thousands of exoplanets; statistical analysis suggests:
  - Nearly 20% of Sun-like stars may host Earth-sized planets in their habitable zones.
- Thus, Earth-sized worlds receiving similar sunlight are not rare.
- This weakens the first part of the hypothesis — that Earth's size and orbit are unique.

Shift in question: from "Where is the planet?" to "What is the planet like?"

2. Atmosphere Retention and Surface Conditions

- JWST observations (e.g. TRAPPIST-1b and 1c) show many rocky planets lack thick atmospheres.
- Around M-dwarf stars (most common in the galaxy), planets often:
  - Lose water due to intense stellar radiation.
  - Build false oxygen atmospheres (chemical, not biological).
  - Are bombarded by stellar flares that strip away air and water.

Only some may retain atmospheres if they have:

- Strong magnetic fields,
- Volcanic outgassing to replenish gases, and
- Favorable stellar conditions.

Hence, Earth-sized ≠ Earth-like.

3. Climate Stabilisation & Plate Tectonics

- Earth's long-term climate is stabilised by plate tectonics, recycling carbon and maintaining habitable temperatures.
- Exoplanet models suggest:
  - Some rocky planets may lack tectonics.
  - Others might regulate climate through volcanism and weathering cycles, even without full plate tectonics.

- Still, no consensus exists — so long-term climate stability (a key to complex life) remains uncertain elsewhere.

4. Role of Giant Planets (e.g. Jupiter)

- Earlier belief: Jupiter shields Earth from asteroids and comets.
- Modern simulations: Jupiter can both protect and endanger inner planets — depending on its orbit and mass.
- Thus, no universal "Jupiter filter" exists — weakening another Rare Earth condition.

Emerging Scientific Consensus (as of 2025)

Aspect	Finding (2025)	Implication
Earth-sized planets in habitable zones	Common (per Kepler)	Weakens rarity claim
Stable, long-lived atmospheres	Uncommon (per JWST)	Supports rarity claim
Plate tectonics & climate stability	Uncertain	Supports partial rarity
Protective system architecture	Variable	Neutral
Technosignatures / advanced life	Not detected (Breakthrough Listen)	Supports rarity

Status Summary

- Simple (microbial) life: Possibly common, as basic organic chemistry is widespread.
- Complex, multicellular life: Still rare, needing a fine balance of factors — stable climate, magnetic field, oceans, atmosphere, and billions of years of continuity.
- Technological civilizations: Likely extremely rare, as no detectable signals (technosignatures) have been found so far.

Hence, the Rare Earth Hypothesis remains plausible — not disproven, but not definitively proven either.

Future Developments

Three areas could redefine our understanding:

1. JWST & ELTs (Extremely Large Telescopes) — detecting atmospheres and water cycles on temperate exoplanets.
2. Geophysical constraints — assessing tectonic or volcanic activity on distant worlds.
3. Detection of biosignatures or technosignatures — direct evidence of life or technology.

Until then, the "microbial common–complex rare" framework stands.

Conclusion

The Rare Earth Hypothesis continues to hold scientific weight for complex life, even as the universe proves abundant in Earth-sized, potentially habitable planets.

- Kepler showed us that Earth's position isn't unique — but JWST reminds us that Earth's conditions might be.
- As our telescopes grow stronger and our methods sharper, humanity edges closer to answering one of its oldest questions:

Are we alone, or just exceedingly rare?

UPSC Mains Practice Question

Ques: What is the "Rare Earth Hypothesis"? Discuss how recent discoveries from the Kepler and James Webb Space Telescopes have reshaped our understanding of planetary habitability and the possibility of complex life beyond Earth. **(250 Words)**

NITIN SIR CLASSES

THE HINDU
INDIA'S NATIONAL NEWSPAPER SINCE 1878

Daily News Analysis

Page : 08 Editorial Analysis

Daily News Analysis

Exploited workers, a labour policy's empty promises

Rejimon Kuttappan

is a forced labour investigator

The draft Shram Shakti Niti 2025 further exposes the gaps in India's labour landscape

In July, while probing instances of forced labour in the seafood industry on India's eastern coast, this writer met hundreds of women driven to desperation, peeling fish heads on cold tables without gloves, all for meagre wages as farming failed their families. Promised Employees' State Insurance (ESI) and Provident Fund benefits at the time of recruitment, they were reclassified as "daily wagers" a month before my visit. There was a modest wage hike, but they lost both benefits as the company stopped contributions. Vulnerable, they toil long hours – trapped in exploitation that has come to define forced labour – exposing the fragility of their legal safeguards in India's labour landscape.

Against this grim backdrop – where 11 million people endure modern slavery in India, the world's highest – the Bharatiya Janata Party-led government unveiled the draft Shram Shakti Niti 2025, which is claimed to be a "future-ready" policy cloaked in "ancient Indian ethos" from texts such as Manusmriti, but is blind to the brutal realities that workers face.

A case of 'employer ease'

Since late 2021, this writer has interviewed thousands of workers in steel factories, sandstone quarries, seafood plants, and textile mills (across west, northwest, east and south India) hired through middlemen on daily wages, without contracts and stripped of their rights. Paid off the payroll through contractors, these workers are denied legal benefits, languishing as part of the 90% informally employed workforce in India, as in a 2024 International Labour Organization (ILO) report.

This policy flouts labour laws, enables wage theft and erodes worker dignity, defying constitutional protections under Articles 14, 16, and 23. It is a cynical rebrand favouring cultural nostalgia and employer ease over justice for workers.

The policy introduces a portable Universal Social Security Account, merging Employees' Provident Fund Organisation, Employees' State Insurance Corporation, Pradhan Mantri Jan Arogya Yojana, e-SHRAM, and State boards for lifelong health, pension, maternity, accident, and life insurance across sectors – invoking Article 41 (right to work, education, and public assistance).

Yet, it dodges funding – no gig employer mandates or state matches – risking the e-SHRAM's paltry payouts. Digital IDs, in a situation of only 38% household literacy, result in the exclusion of women, senior citizens and low-literates, violating Article 15. Further, the absence of union safeguards affects bargaining. The initial phase must enforce offline access and tripartite funds, else this is a case of exploitation.

On the occupational safety front, the policy pledges strict enforcement of the 2020 Occupational Safety, Health and Working Conditions Code, with risk audits and gender-sensitive standards, honouring Directive 42 (state can make provision to secure just and humane conditions of work and for maternity relief) and ILO Convention 155 (women's care-role risks).

But the goal of "near-zero fatalities" by 2047 appears fanciful without penalties and given the reality of inspector shortages. Digital tools exclude informal workers, undermining equality; ignoring gig mental health, while union audits weaken Article 19.

Areas of concern

The hints that the Ministry of Labour and Employment (MoLE) will become an employment facilitator, by using the Artificial Intelligence (AI)-driven National Career Service (NCS) for job matching, credential checks, and skill alignment in Tier-II/III cities and micro and small medium enterprises, merging Skill India to tackle 91.75% graduate mismatches. Yet, absent AI bias safeguards risk caste- and gender-based Article 15 violations.

Ignoring the Wages Code minima for 12 million gig workers – where "flexibility" is a cover for abuse – and unclear transition benefits demand ethics audits and union-vetted algorithms to curb tech-driven inequality.

The policy targets 35% female labour participation by 2030 (from 33.7%) through affordable childcare, flexible gigs, equal pay and apprenticeships –aligning with Article 15's gender equity and the ILO Convention 195's mobility goals. However, without quotas, penalties or sufficient maternity support for informal workers, there can hardly be success. Overlooking youth mental health and caste-gender data gaps hides the unique challenges that Dalit women face, making union-led audits essential for true dignity and progress.

The policy's green-tech vision promotes AI-enhanced safety measures and reskilling opportunities for coal workers, aligning with the climate goals of Sustainable Development Goal 13 and the livelihood rights of Article 21. However, "just transitions" lack substance without income support or union involvement, risking violations of ILO Convention 29. Widening rural-AI gaps and urban-centric green jobs marginalise 400 million informal workers. Tripartite funding and Organisation for Economic Co-operation and Development (OECD) safeguards are essential to avert an exploitative eco-trap that undermines dignity.

The policy, which hints at convergence through Labour and Employment Policy Evaluation Index (LEPEI) dashboards, aims to realise Article 12's vision – of just governance – by linking the National Education Policy with Digital India. However, weak enforcement of the Digital Personal Data Protection Act risks enabling surveillance and undermining Article 19's freedoms.

Amid exploitation and digital optimism, the Shram Shakti Niti 2025 projects a "rights-driven, future-ready" vision for Viksit Bharat. But there are gaps beneath its ambitious rhetoric such as weak regulatory oversight, digital exclusion, unenforced penalties and a fragile adherence to ILO conventions. All these would only accelerate the decline of unions in an expanding gig economy.

It is about dignity, rights and justice

Without concrete funding and institutional safeguards, the promise of universal social protection may collapse under its own weight. For millions trapped in informal and forced labour, the policy's success will ultimately be measured not by its digital dashboards, but by its power to restore dignity, rights, and justice to India's working poor.

The 2025-47 rollout needs urgent pilots, with rights audits for accountability. There needs to be tripartite enforcement, offline access for digitally excluded workers, and transparent grievance redressal. Without these, there is the risk of symbolic rhetoric over justice for India's labouring millions.

GS. Paper 2 Social Justice

UPSC Mains Practice Question: Does India need a nutritional transformation? Discuss the role of functional foods and smart proteins in achieving nutritional security. **(150 Words)**

Daily News Analysis

Context :

The Government of India has released the draft Shram Shakti Niti 2025 — a proposed national labour and employment policy that claims to be "future-ready" and based on "ancient Indian ethos." However, the policy has raised concerns over its inadequate protection for informal and gig workers, digital exclusion, and weak enforcement mechanisms, in a country where over 90% of the workforce is informal (ILO, 2024).

India's labour policy is crucial because it lies at the intersection of economic growth, social justice, and constitutional rights — directly impacting millions of workers enduring precarious and exploitative working conditions.

Static Background

Theme	Key Points
Constitutional Provisions	• Article 14: Equality before law • Article 15: Non-discrimination • Article 16: Equal opportunity in public employment • Article 21: Right to life and livelihood • Article 23: Prohibition of forced labour • Article 41, 42, 43 (DPSPs): Right to work, humane conditions, and living wage
Major Labour Codes (2020)	1. Code on Wages, 2019 2. Industrial Relations Code, 2020 3. Social Security Code, 2020 4. 4. Occupational Safety, Health and Working Conditions Code, 2020
International Conventions	• ILO Convention 29: Forced Labour • ILO Convention 155: Occupational Safety • ILO Convention 195: Gender equality in employment

Current Affairs Context

- Modern Slavery in India: Over 11 million people work under forced or bonded labour conditions — the world's highest (Global Slavery Index 2023).
- Informalisation of Labour: Nearly 90% of India's workforce is informal; most lack contracts, social security, or basic protections.
- Gig Economy Rise: 12 million gig and platform workers with minimal wage or insurance safeguards.

- Shram Shakti Niti 2025: Envisions digital integration, AI-driven employment services, and universal social security — but lacks clarity on funding, implementation, and rights enforcement.

Detailed Analysis

1. Structural Gaps in India's Labour System

- Informality & Exploitation: Majority of workers — especially women in sectors like seafood, textiles, and construction — remain off the payroll, paid in cash, and deprived of benefits such as EPF and ESI.
- Labour Law Evasion: Contracting and "daily wager" reclassification allow employers to bypass social security obligations, leading to forced labour-like conditions.
- Constitutional Violation: Such practices breach Articles 14, 16, and 23 (right against exploitation).

2. The Draft Shram Shakti Niti 2025 – Key Provisions

Positive Intentions:

- Universal Social Security Account (USSA): Aims to merge EPFO, ESIC, PM-JAY, e-SHRAM into a single portable account — ensuring lifelong access to benefits.
- Digital Labour Market: AI-driven National Career Service (NCS) for job matching, credential verification, and skill alignment.
- Female Participation Target: 35% by 2030 via flexible gigs, equal pay, and childcare support.
- Green-Tech Reskilling: Promises just transition for coal and informal workers under SDG 13.

Concerns Raised:

- No Funding Clarity: No employer contribution or state matching fund — risking the failure of the universal social security promise.
- Digital Exclusion: Only 38% household digital literacy; women and rural workers risk being left out.
- Weak Enforcement: Inspector shortage and lack of penalties undermine occupational safety targets like "zero fatalities by 2047."
- AI Bias Risks: AI-driven job matching could replicate caste or gender discrimination (Article 15 concerns).
- Union Marginalisation: Weakening of collective bargaining and declining unionisation in the gig economy.

3. Labour Rights and India's Development Vision : The government links this policy to "Viksit Bharat 2047", but economic growth cannot come at the cost of dignity and justice.India's challenge lies in balancing employer flexibility with worker security — a balance recognised in the ILO's Decent Work Agenda. However, without tripartite consultations (employer–worker–state), offline access for digitally excluded workers, and accountability audits, the policy may deepen inequality instead of resolving it.

Daily News Analysis

4. Key Static + Analytical Linkages for UPSC Answers

Theme	Static Concept	Current Link
Forced Labour	Article 23; ILO Convention 29	Fish-processing and quarry workers' exploitation
Social Security	Article 41–43; Social Security Code 2020	Digital Universal Account lacks funding clarity
Women's Labour Participation	Article 15 & 42	Policy target 35% female participation without quotas
AI in Labour Market	Right to Equality (Art. 14) & Data Protection	Risk of caste/gender bias, privacy invasion
Occupational Safety	ILO Convention 155	Policy target unrealistic without enforcement
Just Transition (SDG 13)	Environmental justice & livelihood rights	Lacks support for displaced coal workers

Way Forward

1. Tripartite Enforcement Mechanism: Empower labour unions and civil society in implementation and audits.
2. Offline & Local Access: Provide grievance redressal in local languages for digitally excluded workers.
3. Dedicated Social Security Fund: Mandatory employer contribution and state matching grants to sustain benefits.
4. AI Ethics and Inclusion Framework: Independent audits to prevent algorithmic bias and protect privacy rights.
5. Strengthen Labour Inspection Systems: Fill vacancies, digitise monitoring, and enforce strict penalties for non-compliance.
6. Gender-Sensitive Labour Reforms: Ensure maternity benefits, childcare infrastructure, and equal pay enforcement.

Conclusion

The Shram Shakti Niti 2025 embodies an ambitious vision for a digitally integrated labour system — but without financial backbone, offline accessibility, and rights-based enforcement, it risks becoming a policy of empty promises.

Daily News Analysis

For a nation aspiring to Viksit Bharat by 2047, the measure of progress lies not merely in growth figures or digital dashboards, but in restoring dignity, security, and justice to its working poor — the true builders of India's development.