

## 2024\_10\_09 DAILY CURRENT AFFAIRS

### TOPICS COVERED

1. PSLV C-37 rocket body re-enters the earth's atmosphere: ISRO (GS Paper-III: S&T)
2. Machine learning pioneers win Physics Nobel (GS Paper-III: S&T)
3. Floriculture blossoms in one of the backward regions of Odisha (GS Paper-I: Geography)
4. New candidates and caste coalitions help BJP beat anti-incumbency factor
5. Mindfulness India Summit scheduled for Oct. 17-18
6. India makes pledge of \$300 million for WHO programme
7. At film awards, Murmu calls for women-led development
8. Rajnath, German counterpart discuss defence trade ties
9. Study uncovers surprising new 'spatial grammar' of gene expression (GS Paper-III: S&T)
10. How ants free fall without incident (GS Paper-III: Basic Science)
11. From solidarity to pseud, India's shift on Palestine
12. Deep roots (GS Paper-III: S&T)
13. What does USCIRF report say about India? (GS Paper-II: IR)
14. Why is the textile industry struggling to perform better? (GS Paper-III: Industry)
15. Global Digital Compact: advancing digital innovation in a sustainable fashion (GS Paper-II: Global Governance)



The ISRO launched the PSLV-C37 rocket, carrying a record 104 satellites, from Sriharikota in February 2017. PTI

## PSLV C-37 rocket body re-enters the earth's atmosphere: ISRO

[GS Paper III: Science and Technology](#)

**The Hindu Bureau**  
BENGALURU

The Indian Space Research Organisation (ISRO) said that the upper stage of the Polar Satellite Launch Vehicle C-37 (PSLV C-37 mission) re-entered the earth's atmosphere on Sunday.

The PSLV-C37 mission was launched on February 15, 2017, with Cartosat-2D as the main payload along with another 103 satellites as co-passengers, namely INS-1A, INS-1B, Al-Farabi 1, BGUSAT, DIDO-2, Nayif 1, PEASS, 88 Flock-3p satellites, and 8 Lemur-2 satellites. The space agency created history as it was the first mission to launch 104 satellites with a single vehicle. After injecting the satellites and passivation, the upper stage (PS4) was left at an orbit of approximately 470x494 km.

"It was regularly tracked by U.S. Space Command (USSPACECOM) as an object with NORAD id 42052. Its orbital altitude slowly decayed, primarily due to atmospheric drag effects,"

ISRO said on Tuesday.

Since September, ISRO System for Safe and Sustainable Space Operations Management (IS4OM) regularly monitored the orbital decay as part of its regular activities and predicted re-entry into the atmosphere in the first week of October. "The orbit had decayed to a size of 134x148 km, as of October 6, 2024. As per USSPACECOM prediction, the re-entry took place on Sunday at 15:49 UTC while IS4OM prediction showed that re-entry would occur on Sunday at 15:48:25 UTC. The impact point is in the North Atlantic Ocean," ISRO said.

### Debris mitigation

The atmospheric re-entry of the rocket body is fully compliant with the international debris mitigation guidelines, in particular, the guideline of Inter-Agency Space Debris Coordination Committee that recommends limiting the post-mission orbital life of a defunct object in Low Earth orbit to 25 years.

## PSLV C-37 rocket body re-enters the earth's atmosphere: ISRO (9 October)

- ISRO announced the re-entry of the upper stage of PSLV C-37 on Sunday.
- The PSLV-C37 mission was launched on February 15, 2017, with Cartosat-2D as the main payload and 103 co-passenger satellites.
- Co-passenger satellites included INS-1A, INS-1B, Al-Farabi 1, BGUSAT, DIDO-2, Nayif 1, PEASS, 88 Flock-3p satellites, and 8 Lemur-2 satellites.
- The mission set a record by launching 104 satellites with a single vehicle.
- After satellite deployment and passivation, the upper stage (PS4) was left in an orbit of approximately 470x494 km.
- The object was tracked by U.S. Space Command (USSPACECOM) with NORAD id 42052.
- Orbital altitude decayed gradually due to atmospheric drag effects.
- ISRO's System for Safe and Sustainable Space Operations Management (IS4OM) monitored the orbital decay and predicted re-entry in early October.
- As of October 6, 2024, the orbit had decayed to 134x148 km.
- USSPACECOM predicted re-entry occurred on Sunday at 15:49 UTC, while IS4OM predicted 15:48:25 UTC.
- The impact point was in the North Atlantic Ocean.
- The re-entry of the rocket body complied with international debris mitigation guidelines.
- The guidelines recommend limiting the post-mission orbital life of defunct objects in Low Earth orbit to 25 years.

# Machine learning pioneers win Physics Nobel

GS Paper III: Science and Technology

**Vasudevan Mukunth**  
CHENNAI

The 2024 Nobel Prize in Physics has been awarded to John Hopfield and Geoffrey Hinton “for foundational discoveries and inventions that enable machine learning with artificial neural networks”, the Royal Swedish Academy of Sciences announced on Tuesday.

While many areas of research have used machine learning (ML) models and artificial neural networks (ANNs) to process data, these terms have entered the household, thanks to the explosion of chat AI apps, including ChatGPT.

The work of this year’s laureates concerns the theoretical foundations of ma-

chines that can learn without humans teaching them and can use their knowledge to answer questions. ANNs are collections of neurons, or more broadly nodes capable of processing data, connected in specific ways. In a recurrent neural network, information can flow both ways.

## Recurrent networks

Professor Hopfield, of Princeton University in the U.S., is credited with developing the Hopfield network, a type of recurrent neural network. Its neurons learn and process information based on Hebbian learning – an idea in neuropsychology that if one neuron repeatedly triggers a second, the connection between the two



Professor John Hopfield, left, and Professor Geoffrey Hinton. AP

becomes stronger.

The rules of a Hopfield network are based on the physics of a group of atoms, each producing its own small magnetic field. The processes the network performs to complete an incomplete pattern or to denoise an image are the same ones that, by analogy, would reduce the total energy of the magnetic atoms. “In his 1982 paper,

Hopfield asked a basic question about the ability of a large collection of simple neurons to form computational tasks as a spontaneous collective or emergent phenomenon,” Spenta Wadia, founding director of the International Centre for Theoretical Sciences, Bengaluru, said.

“He analysed this in a model system which included biological ingre-

dients. The paper laid the foundation of the use of statistical physics methods and ideas in neural circuit modelling.”

Professor Hinton, of the University of Toronto, and his peers adapted another network called the Boltzmann machine to perform cognitive tasks, building on the principles of the Hopfield network, among others.

He made a breakthrough in the 2000s by developing a learning algorithm for a modified ANN called a restricted Boltzmann machine (RBM). A layer of neurons could be trained as an RBM and multiple layers could be stacked, creating the first ANNs capable of deep learning.

## Machine learning pioneers win Physics Nobel (9 October)

- The 2024 Nobel Prize in Physics was awarded to John Hopfield and Geoffrey Hinton for foundational discoveries enabling machine learning with artificial neural networks.
- The Royal Swedish Academy of Sciences announced the award on Tuesday.
- Machine learning (ML) models and artificial neural networks (ANNs) have become widely recognized due to the rise of chat AI applications like ChatGPT.
- The laureates' work focuses on the theoretical foundations of machines that can learn independently and answer questions.
- ANNs consist of neurons or nodes connected in specific ways to process data.
- In recurrent neural networks, information can flow both ways.
- Professor Hopfield developed the Hopfield network, a type of recurrent neural network.
- Hopfield networks use Hebbian learning, where repeated activation of one neuron strengthens its connection to another.
- The rules of a Hopfield network are based on the physics of atoms producing small magnetic fields.
- The network's processes for completing patterns or denoising images are analogous to reducing the total energy of magnetic atoms.
- In his 1982 paper, Hopfield posed a question about how simple neurons can perform computational tasks as an emergent phenomenon.

- His analysis included biological ingredients and laid the foundation for using statistical physics methods in neural circuit modeling.
- Professor Hinton adapted the Boltzmann machine for cognitive tasks, building on principles from the Hopfield network.
- In the 2000s, Hinton developed a learning algorithm for a modified ANN called a restricted Boltzmann machine (RBM).
- RBMs allowed for training a layer of neurons, with multiple layers stacked to create the first ANNs capable of deep learning.

## Floriculture blossoms in one of the backward regions of Odisha

GS Paper I:  
Geography  
BY BHABHINAVSAR

Jujumara, located in Odisha's Sambalpur district, is a forested region that has been a relatively late entrant into the development process. However, it has now hit the headlines for being home to one of the first Farmer Producer Organisations (FPO) in the State, dedicated exclusively to flower cultivation.

Farmers in Jujumara have long been familiar with floriculture, thanks to the region's favourable climate. However, flowers were never the primary source of income for them. In Sanatanpali, a small village in the area, only two or three farmers once grew flowers to sell in local markets a decade ago.

Now, with over 10 acres dedicated to floriculture, the village is witnessing the early signs of a quiet revolution.

Sabuja Sanatanpali Farmer Producer Company Limited, an FPO, has blossomed



**Empowering lives:** Farmers in Jujumara area have been provided with honeybee boxes as part of efforts to make floriculture sustainable. SPECIAL ARRANGEMENT

from its roots in Sanatanpali, reaching out to at least 20 villages, where 250 farmers have embraced floriculture in recent years.

While the number may seem modest compared to floriculture hubs in West Bengal, Andhra Pradesh, and Karnataka, the shift from traditional paddy farming marks a significant and promising change in mindset.

Lucknow-based CSIR-National Botanical Research Institute (CSIR-NBRI)'s intervention with scientific inputs has made farmers more hopeful with the productivity showing an improvement in recent years.

"Farmers have traditionally focused on paddy cultivation, passing down the practice through generations. But, many remain unaware of the shifting

market demands, where the need for diverse farm-based products is on the rise.

Floriculture, in particular, has emerged as a lucrative business, offering quick returns. Unlike conventional crops that require farmers to wait until the end of a harvesting season for profit, flower cultivation provides a steady and more immediate income stream,"

said NBRI Director Ajit Kumar Shasany. Scientific inputs play a crucial role in boosting yields, whether in floriculture or any other form of agriculture that farmers engage in, Dr. Shasany maintained.

### Real-time updates

According to Manobodh Barik, managing director of an FPO, with farmers now united under a common platform, they no longer face the challenge of excess production going unsold in the market.

"We have created a WhatsApp group where real-time updates on market trends and demand for specific flower species are shared. This initiative is motivating more farmers to get involved, as they feel more confident in managing their production and sales effectively," Mr. Barik said, adding that such techniques of farming and marketing were unimaginable a few years ago.

To make floriculture sus-

tainable, the CSIR-NBRI has now introduced apiculture among farmers, distributing 150 honeybee boxes and other toolkits.

"Apiculture serves as a valuable supplementary activity for rural households engaged in floriculture. To support farmers in adopting bee-keeping as a livelihood, we have provided practical training and live honeybee colonies," said Soumit Kumar Behera, Senior Principal Scientist with NBRI.

Abhilash Pradhan, a horticulturist involved with an FPO, said farmers' earnings have risen sharply after they took to floriculture. "Farmers typically earned a profit of ₹20,000 to ₹25,000 per acre from paddy cultivation during the Kharif season, with an additional ₹20,000 during the Rabi season, bringing the total to around ₹40,000 per acre. However, after they shift to floriculture, profits are estimated to exceed ₹1 lakh per acre."

## Floriculture blossoms in one of the backward regions of Odisha (9 October)

- Jujumara, in Odisha's Sambalpur district, is a forested region that has recently entered the development process.
- It is home to one of the first Farmer Producer Organisations (FPO) in the state, dedicated exclusively to flower cultivation.
- Farmers in Jujumara are familiar with floriculture due to the region's favorable climate, but flowers were not a primary income source.

- A decade ago, only two or three farmers in Sanatanpali, a small village, grew flowers for local markets.
- Currently, over 10 acres in Sanatanpali are dedicated to floriculture, indicating a significant change.
- Sabuja Sanatanpali Farmer Producer Company Limited has expanded its reach to at least 20 villages, involving 250 farmers in floriculture.
- Although the number of farmers is modest compared to floriculture hubs in West Bengal, Andhra Pradesh, and Karnataka, the shift from paddy farming is notable.
- CSIR-National Botanical Research Institute (CSIR-NBRI) has provided scientific inputs that have improved productivity.
- Farmers have traditionally focused on paddy cultivation but are increasingly aware of changing market demands for diverse products.
- Floriculture offers quick returns compared to conventional crops, which require waiting for the end of the harvesting season for profit.
- CSIR-NBRI introduced apiculture, distributing 150 honeybee boxes and toolkits to farmers.
- Apiculture serves as a supplementary activity for rural households engaged in floriculture, with training and live honeybee colonies provided.
- Farmers' earnings have increased significantly after adopting floriculture.
- Previously, farmers earned around ₹40,000 per acre from paddy, but profits from floriculture are estimated to exceed ₹1 lakh per acre.
- Scientific inputs are crucial for boosting yields in both floriculture and other agricultural practices.
- Farmers are now united under a common platform, alleviating the challenge of unsold excess production.
- A WhatsApp group has been created to share real-time updates on market trends and demand for specific flower species.
- This initiative is motivating more farmers to participate, improving their confidence in managing production and sales effectively.
- Such farming and marketing techniques were unimaginable a few years ago.

## NGT seeks report on encroachments and afforestation in hilly districts of Kerala

**The Hindu Bureau**  
KOCHI

The National Green Tribunal (NGT) has asked the Kerala Department of Environment to file a report on the encroachments identified in the hill districts of the State.

The Southern Bench of the tribunal issued the directive recently while considering a report submitted by the department in connection with the landslides in Wayanad on July 30. The tribunal, which took *suo motu* notice of the disaster based on a report published in *The Hindu*, said in its order dated September 27 that the report filed by the Director of Environment and Climate Change (respondent 4) was



A photo of damaged houses in Chooralmala village a month after the Wayanad landslides disaster that struck Kerala on July 30. PTI

incomplete, particularly the number of villages in Wayanad district as mentioned in the Madhav Gadgil committee report (Western Ghats Ecology Expert Panel) and how many out of them were identified as landslide-prone.

The Bench asked the Department of Environment to file an additional report about the encroachers and the action taken for their eviction by the local authority. In its order dated August 2, 2024, it asked the respondents to submit

a report on seven aspects, including the number of encroachments identified in the hilly districts of the State and the number of illegal possessions removed since 2010.

It also stated that there was no answer to the question specifically asked for regarding the measures initiated for afforestation in the hill districts and also the afforestation done since 2010. Let the method and mechanism initiated to prevent the landslides in the hilly areas of the State of Kerala also be reported, it said.

The tribunal asked the District Collectors of Wayanad and Idukki to file a report on the seven queries that it raised in the order dated August 2.

## NGT seeks report on encroachments and afforestation in hilly districts of Kerala (9 October)

- The National Green Tribunal (NGT) directed the Kerala Department of Environment to file a report on encroachments in the hill districts.

- The directive was issued while considering a report related to landslides in Wayanad on July 30.
- The tribunal took suo motu notice of the disaster based on a report published in *The Hindu*.
- In its order dated September 27, the tribunal noted the report from the Director of Environment and Climate Change was incomplete.
- The report lacked details on the number of villages in Wayanad as mentioned in the Madhav Gadgil committee report and the number identified as landslide-prone.
- The tribunal requested an additional report on encroachers and actions taken for eviction by local authorities.
- In its order dated August 2, 2024, the tribunal asked for a report on seven aspects, including:
  - Number of encroachments identified in the hilly districts.
  - Number of illegal possessions removed since 2010.
- The tribunal noted there was no response regarding measures initiated for afforestation in the hill districts and afforestation done since 2010.
- It requested details on methods and mechanisms initiated to prevent landslides in Kerala's hilly areas.
- The tribunal asked District Collectors of Wayanad and Idukki to report on the seven queries raised in the August 2 order.

# New candidates and caste coalitions help BJP beat anti-incumbency factor

## NEWS ANALYSIS

**Vikas Vasudeva**  
CHANDIGARH

In Haryana, where around 36 castes make up its social mosaic, the results of the 2024 Assembly election have yet again upheld the theory that the State's politics spin around coalitions of castes.

Defying an anti-incumbency narrative after a decade-long rule in the State, the Bharatiya Janata Party (BJP) will form a government in the State for the third time. To reduce the impact of any anti-incumbency trend, the BJP replaced party candidates in nearly 25 seats, and the results show it has won close to 15 seats where candidates were dropped or replaced.

The BJP focused its electoral politics surrounding the consolidation of non-Jats, primarily the backward class, which forms about 35% of the State's population, and it appears to have paid the party dividends.

Earlier this year, by replacing Manohar Lal with Nayab Singh Saini, an OBC leader, as Chief Minister, the BJP seemed determined to maintain an electoral hold over the community and also attempted to negate the anti-incumbency factor. These steps seem to have worked in its favour.

Besides, the party's out-



**On the podium:** BJP candidate and Haryana Chief Minister Nayab Singh Saini celebrates with party supporters on Tuesday. PTI

reach to Dalits has come in handy as it has successfully increased its tally of Scheduled Caste (SC) reserved seats. In Haryana, there are 17 such seats, and the BJP won seven, up by two from the 2019 tally of five.

### Key factors

The **micro-management at the booth level by the BJP appeared to have made a difference.** The party's effort with the RSS leaders to successfully counter the Opposition's narrative surrounding "farmers, soldiers and wrestlers" to corner the BJP was handled aptly.

The Congress failed to put up a united front and yet again appears to have succumbed to the party State unit's "factionalism", which it repeatedly continues to deny.

The division in the party among the camps of former Chief Minister Bhupinder Singh Hooda and Lok Sabha member Kumari Selja was evident and on pu-

blic display in the run-up to the polls. The failure of the party's central leadership to address the critical factionalism issue has raised several questions.

Apart from this, the Congress was heavily relying on the consolidation of Jats (agrarian class), who make up about 22% of the population, besides the Dalit community, 20% of the State's population, for victory. But with Dalit votes getting divided, the party has suffered a dent.

The Jannayak Janta Party (JJP), the former coalition partner of the BJP, faced a complete drubbing as it failed to open its account. The JJP, which draws its support largely from the agrarian class, appears to have ended splitting its vote among the BJP, the Congress, and the Indian National Lok Dal.

The INLD, once a force in Haryana's politics, yet again failed to deliver an impressive show as it won merely two seats.

## New candidates and caste coalitions help BJP beat anti-incumbency factor (9 October)

- Haryana's social landscape consists of around 36 castes, influencing its political dynamics.
- The 2024 Assembly election results reaffirm the coalition-based politics in the state.
- The Bharatiya Janata Party (BJP) will form a government for the third time, despite a decade-long incumbency.
- To mitigate anti-incumbency effects, the BJP replaced candidates in nearly 25 seats, winning close to 15 of those.
- The BJP focused on consolidating non-Jat votes, particularly from the backward class, which constitutes about 35% of the population.
- Replacing Manohar Lal with OBC leader Nayab Singh Saini as Chief Minister aimed to strengthen ties with the community and counteract anti-incumbency.
- The BJP's outreach to Dalits helped it increase its count of Scheduled Caste (SC) reserved seats, winning seven out of 17, up from five in 2019.
- Micro-management at the booth level by the

BJP significantly impacted election results.

- The BJP effectively countered opposition narratives related to "farmers, soldiers, and wrestlers."
- The Congress struggled to present a united front, hindered by factionalism within its state unit.
- Divisions between former Chief Minister Bhupinder Singh Hooda and Lok Sabha member Kumari Selja were apparent leading up to the election.

- The Congress's reliance on consolidating Jat votes (22% of the population) and Dalit votes (20% of the population) was undermined by divided Dalit support.
- The Jannayak Janta Party (JJP), a former BJP coalition partner, faced significant losses, failing to win any seats.
- The JJP, primarily supported by the agrarian class, split votes among the BJP, Congress, and Indian National Lok Dal (INLD).
- The INLD, once a prominent political force in Haryana, only managed to win two seats.

## Mindfulness India Summit scheduled for Oct. 17-18 (9 October)

- The third edition of the annual Mindfulness India Summit will be held in Mumbai on October 17 and 18.
- The summit aims to equip leaders and professionals with strategies to create healthier, more empathetic work environments.
- It is organised by the Mindful Science Centre and led by global mindfulness expert Manish Behl.
- Topics to be explored include mindfulness, emotional intelligence, and neuroscience.
- The event is supported by the Confederation of Indian Industry (CII) and has The Hindu as its media partner.
- The summit will feature over 30 international experts in these fields.
- Keynote speakers include Sara Lazar and Chris Germer from Harvard Medical School, Emma Seppälä from Yale University, and U.K. politician Chris Ruane.

### Mindfulness India Summit scheduled for Oct. 17-18

PCS

**The Hindu Bureau**

MUMBAI

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Keynote speakers include renowned figures such as Sara Lazar and Chris Germer from Harvard Medical School, Emma Seppälä from Yale University, and U.K. politician Chris Ruane.

# India makes pledge of \$300 million for WHO programme

**Bindu Shajan Perappadan**  
NEW DELHI

India, the sixth largest global contributor of core funding to the World Health Organisation (WHO), has now committed to give more than \$300 million for the organisation's core programme of work from 2025 to 2028. The biggest chunk of \$250 million will be spent on the Centre of Excellence for Traditional Medicine.

So far, WHO has received contribution pledges for over \$2.2 billion towards a \$7.1 billion funding gap.

Over the next four years, WHO has the mandate to use these funds to save at least 40 million lives through various programmes, such as increasing the number of vaccines delivered to priority countries, supporting 55 countries in educating and employing 3.2 million health workers, and prequalifying 400 health products per year.

India has committed the largest amount of funds so

far in southeast Asia. Apart from the traditional medicine centre, \$38 million is being given for a new premises for WHO's regional office, \$10 million for digital health, and \$4.6 million for thematic funding.

## 'Health for all'

"The funds being sought are not additional resources, but those needed by the organisation for its core work, to deliver on its mandate to promote, provide and protect health and well-being for all," WHO's regional office said in a statement. It added that countries in WHO's South-East Asia Region and key partner organisations have pledged over \$345 million in financing for the organisation's core programme of work from 2025 to 2028.

"Indonesia and Bhutan committed to provide a pledge amount in the coming weeks," WHO said, adding that this investment round will see several events this year, culminating in a grand pledging ceremony in November on the sidelines of the G-20 summit in Brazil.

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- India is the sixth largest global contributor of core funding to the World Health Organisation (WHO).
- The country has committed over \$300 million for WHO's core programme of work from 2025 to 2028.
- The largest portion of \$250 million will be allocated to the Centre of Excellence for Traditional Medicine.
- WHO has received contribution pledges totaling over \$2.2 billion towards a \$7.1 billion funding gap.
- The funds will be used to save at least 40 million lives through various programmes over the next four years.
- Key initiatives include increasing vaccine deliveries to priority countries, supporting 55 countries in educating and employing 3.2 million health workers, and prequalifying 400 health products annually.
- India has committed the largest amount of funding in Southeast Asia.
- Additional allocations include \$38 million for a new premises for WHO's regional office, \$10 million for digital health, and \$4.6 million for thematic funding.
- WHO's regional office stated that the sought funds are necessary for the organisation's core work to promote health and well-being for all.
- Countries in WHO's South-East Asia Region and key partners have pledged over \$345 million for the core programme from 2025 to 2028.
- Indonesia and Bhutan are expected to provide pledges in the coming weeks.

- This investment round will include several events, culminating in a grand pledging ceremony in November during the G-20 summit in Brazil.

# At film awards, Murmu calls for women-led development

**The Hindu Bureau**  
NEW DELHI

President Droupadi Murmu on Tuesday gave away the 70th National Film Awards to the winners in various categories. Veteran actor Mithun Chakraborty was honoured with the Dadasaheb Phalke Lifetime Achievement Award for 2022.

Speaking on the occasion, Ms. Murmu said only 15 of the 85 awardees were women. She called for more efforts to ensure women-led development in the film industry. "I believe that films and social media are a great tool to bring about a change in society," she said.

Information & Broadcasting Minister Ashwini Vaishnaw, and Union Minister of State L. Murugan were present.

The best feature film award went to *Aattam* (The Play), a Malayalam film directed by Anand Ekarshi and Best Non-Feature Film to *Ayena* (Mirror), directed by Siddhant Sarin. Rishab Shetty got the award for the best male actor in a leading role for his performance in *Kantara* (Kanna-



The President presents the award for the best female actor in a lead role to Nithya Menen in New Delhi on Tuesday. SUSHIL KUMAR VERMA

da). The award for the best female actor in a leading role went to Nithya Menen for her portrayal in *Thiruchitrabalam* (Tamil) and Manasi Parekh for *Kutch Express* (Gujarati). The best director award went to Sooraj R. Barjatya for the Hindi film *Uunchai*.

Some of the other award winners included *Brahmastra - Part 1: Shiva* in the Best Film in Animation, Visual Effects, Gaming & Comic category; *Kantara* for Best Popular Film Providing Wholesome Entertainment; and *Kishore Kumar: The Ultimate Biography* for Best Book on Cinema.

*Aattam* was also awarded for being the best in Editing (Mahesh Bhuvanend) category and for Screenplay (Anand Ekarshi) jointly with Hindi film *Gulmohar* (Arpita Mukherjee and Rahul V. Chittella); and the Best Choreography award went to Sathish Krishnan for his work in *Thiruchitrabalam*. *Gulmohar* got the Best Hindi Film award as well, while Niki Joshi won the Best Costume Designer award for *Kutch Express*.

A. R. Rahman got the Best Music Director (background music) award for Mani Ratnam's *Ponnyin Selvan-Part 1* (Tamil).

Anand Ekarshi.

- The Best Non-Feature Film award went to *Ayena* (Mirror), directed by Siddhant Sarin.
- Rishab Shetty won Best Male Actor in a Leading Role for his performance in *Kantara* (Kannada).
- The award for Best Female Actor in a Leading Role was shared by Nithya Menen for *Thiruchitrabalam* (Tamil) and Manasi Parekh for *Kutch Express* (Gujarati).
- Best Director was awarded to Sooraj R. Barjatya for the Hindi film *Uunchai*.
- Other notable winners included *Brahmastra - Part 1: Shiva* for Best Film in Animation, Visual Effects, Gaming & Comic category and *Kantara* for Best Popular Film Providing Wholesome Entertainment.

## At film awards, Murmu calls for women-led development (9 October)

- President Droupadi Murmu presented the 70th National Film Awards to various winners on Tuesday.
- Veteran actor Mithun Chakraborty received the Dadasaheb Phalke Lifetime Achievement Award for 2022.
- Ms. Murmu noted that only 15 of the 85 awardees were women and called for more efforts for women-led development in the film industry.
- She emphasized that films and social media can be powerful tools for societal change.
- Information & Broadcasting Minister Ashwini Vaishnaw and Union Minister of State L. Murugan were also present at the ceremony.
- The Best Feature Film award was given to *Aattam* (The Play), directed by

- *Kishore Kumar: The Ultimate Biography* won Best Book on Cinema.
- *Aattam* also received awards for Best Editing (Mahesh Bhuvanend) and Best Screenplay, shared with *Gulmohar* (Arpita Mukherjee and Rahul V. Chittella).
- Best Choreography was awarded to Sathish Krishnan for *Thiruchitrambalam*.
- *Gulmohar* received the Best Hindi Film award.
- Niki Joshi won the Best Costume Designer award for *Kutch Express*.
- A. R. Rahman received the Best Music Director (background music) award for *Ponnyin Selvan-Part 1* (Tamil).

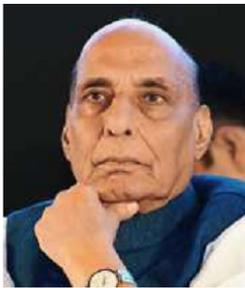
## Rajnath, German counterpart discuss defence trade ties

**Dinakar Peri**  
NEW DELHI

Ahead of German Chancellor Olaf Scholz's visit to India later this month, Defence Minister Rajnath Singh and his German counterpart Boris Pistorius discussed ways to further strengthen defence industrial collaboration and supply chain resilience in a telephonic conversation on Tuesday.

Mr. Scholz's visit for inter-governmental consultations, scheduled in the second half of this month, come amid the much-awaited decision on the qualifying bids in the Indian Navy's multi-billion dollar deal for six conventional submarines in which German company TKMS (Thyssenkrupp Marine Systems) is competing with Navantia of Spain.

"They briefly reviewed the ongoing defence cooperation activities including exercises in the air and maritime domains. The Ministers discussed ways to further strengthen the defence industrial collaboration and enhance supply



Rajnath Singh

chain resilience," a Ministry statement said on the telephonic conversation.

The Navy's mega-submarine deal under Project-75I, estimated upwards of ₹43,000 crore, has crossed a major milestone with the completion of Field Evaluation Trials (FET) to check the compliance of the two bids received.

While an Indian Navy team visited the TKMS shipyard in March for the FET, the evaluation of Navantia's offer was conducted in the last week of June, as reported by *The Hindu* earlier. The staff evaluation is in progress, a defence official said, without elaborating on the timeline.

## Rajnath, German counterpart discuss defence trade ties (9 October)

- Ahead of German Chancellor Olaf Scholz's visit to India later this month, Defence Minister Rajnath Singh spoke with German Defence Minister Boris Pistorius.
- They discussed strengthening defence industrial collaboration and supply chain resilience during their telephonic conversation.
- Scholz's visit for inter-governmental consultations is scheduled for the second half of this month.
- This visit coincides with the pending decision on qualifying bids for the Indian Navy's multi-billion dollar deal for six conventional submarines.
- German company TKMS (Thyssenkrupp Marine Systems) is competing with Spain's Navantia for this contract.
- The ministers reviewed ongoing defence cooperation activities, including exercises in air and maritime domains.
- The discussions aimed to enhance defence industrial collaboration and supply chain resilience.
- The Navy's submarine deal under Project-75I is estimated to exceed ₹43,000 crore and has reached a significant milestone with the completion of Field Evaluation Trials (FET).
- An Indian Navy team visited the TKMS shipyard in March for the FET, while Navantia's offer was evaluated in late June.
- Staff evaluation of the bids is currently in progress,

although specific timelines were not provided by a defence official.

# Study uncovers surprising new 'spatial grammar' of gene expression

The findings can 'help filter and refine genomic tools and algorithms that predict gene expression,' which can inform new diagnostic and therapeutic strategies for diseases like cancers caused by mutations in regulatory elements, says Meenakshi Ghosh, a structural biologist turned clinical scientist

GS Paper III: S&T

Sneha Khedkar

In his quest to understand how each cell of an organism interprets the same genome in a different way, researcher Sascha Duttke wondered whether there might be any undiscovered rules of biology.

The human genome contains information about our development, functioning, growth, and reproduction, and all of it takes up only about 2 MB of space.

"That led us to wonder: maybe some of the magic is in the CD player, too?" Duttke, an assistant professor at the College of Veterinary Medicine, Washington State University, wrote in an email. "In this analogy, the CD is our genome and the CD player is the regulatory machinery," and the transcription factors are important components in the player.

## Inspired by a toddler

Transcription factors are proteins that bind to specific portions of the DNA and control the rate at which the cell transcribes genetic information from DNA to RNA. The cell then makes proteins by "reading" the RNA.

Groundbreaking new work by Duttke and his colleagues has shown that the fate of a gene being transcribed depends on the location of the transcription factor binding site relative to the location where transcription begins.

The results, published in the journal *Nature*, provide insights into how different spatial arrangements of the same transcription factors can have different effects.

The findings can "help filter and refine genomic tools and algorithms that predict gene expression," which can inform new diagnostic and therapeutic strategies for diseases like cancers caused by mutations in regulatory elements, Meenakshi Ghosh, a structural biologist turned clinical scientist, said.

"Watching my toddler destroy a puzzle by forcing in the right colour but the wrong shaped piece made me think: maybe we've been focusing too much on transcription factor binding sites and protein interactions, and not enough on how everything fits together spatially and in an even bigger picture," Duttke said.

## Before or after?

The team investigated whether the arrangement of transcription factors relative to the transcription start site could influence gene expression.

When presented with the DNA, the activator transcription factor binds to it at



Transcription factors are proteins that bind to specific portions of the DNA and control the rate at which the cell transcribes genetic information from DNA to RNA. Representative illustration. GETTY IMAGES

specific points, the binding sites. These points are different from the transcription start site.

Team members developed tools to help them analyse patterns in the building blocks of the DNA that are typically found at the start sites. They subjected cells specially cultured in the lab to a form of RNA sequencing that could detect these sites in RNA. Then they identified the preferred locations at which transcription factors bound relative to an active start site.

The researchers found the binding sites for activator transcription factor NRF1 were located before the start sites and for factor YY1 it was located after the start site. Curiously, NRF1 is an activator whereas YY1 is both an activator and a repressor, a factor that stops transcription.

Next they checked how the relative position of the start site affected how the transcription factor behaved.

When they knocked down the gene that cells used to make NRF1, the cells transcribed less DNA only when NRF1's binding site was located before the transcription start site. If its binding site was located after, the absence of NRF1 increased the transcription rate.

## Natural genetic variations

These results were "surprising," Duttke said. "If you look in textbooks or even Wikipedia, transcription factors are usually grouped into either activators or repressors. The fact that some factors can do both was considered unusual."

Organisms often carry natural genetic variations at the binding sites. The researchers assessed how these variations influenced the start of transcription. They analysed more than 4 million variations



If you look in textbooks or even Wikipedia, transcription factors are usually grouped into either activators or repressors. The fact that some factors can do both was considered unusual

and 80,000 start sites in mice cells and found opposing transcription outcomes depending on whether the variations affected the factors before or after the start site. For instance, only mutations affecting NRF1 binding before the start site reduced the transcription rate.

The researchers also synthetically inserted binding sites for six factors at different distances from the start sites in some DNA sequences. They observed similar position-dependent outcomes. For example, adding an NRF1 binding site ahead of the start increased transcription, consistent with its activator function. Inserting it after the start site reduced transcription.

## 'Spatial grammar'

Last, the researchers studied the relevance of these effects in human diseases.

They identified start sites from genomic sequences from 67 people and combined this information with databases that describe disease risk linked to specific genetic variants. Consistent with previous results, they observed position-dependent effects of disease-associated variants based on the location of the start sites and the binding sites.

"Uncovering this spatial 'grammar' was

## THE GIST

Transcription factors are proteins that bind to DNA and control the rate at which the cell transcribes genetic information from DNA to RNA. The cell then makes proteins by reading the RNA

The fate of a gene depends on the location of the transcription factor binding site relative to where it begins. Cells transcribed less DNA only when NRF1's binding site was before the transcription start site. If it was located after, absence of NRF1 increased transcription

This spatial grammar was a defining moment for scientist working to understand how DNA encodes instructions for turning genes on and off. The results have vast potential, including helping researchers identify and predict disease-associated mutations

a true eureka moment for many scientists like us who are working to understand how DNA encodes the instructions for turning genes on and off," Duttke said, adding it would be "exciting" to explore how interactions between different factors affect this spatial grammar.

These results have "vast potential applications," including helping researchers identify and predict disease-associated mutations, called polymorphisms, that occur outside genes and provide a basis for therapeutic interventions.

"How many of those polymorphisms contribute to disease is currently largely unknown," he said. "The discovery of the spatial grammar may help to change that."

## The light of evolution

"This study is pretty cool," Ghosh said. "It adds crucial new insights about how positioning and spacing relative to [start sites] can impact the ability of [factors] to either activate or repress gene expression."

She added that the results can also improve our understanding of evolution and how organisms regulate gene expression to adapt to environmental changes.

Duttke said he would like to understand more about how this grammar evolved and how it helped create complex organisms like humans. He quoted the title of geneticist Theodosius Dobzhansky's famous 1973 essay to make his point: "Nothing in biology makes sense except in the light of evolution."

(Sneha Khedkar is a biologist turned freelance science journalist. snehakhedkar30@gmail.com)

# Study uncovers surprising new ‘spatial grammar’ of gene expression (9 October)

**The findings can ‘help filter and refine genomic tools and algorithms that predict gene expression,’ which can inform new diagnostic and therapeutic strategies for diseases like cancers caused by mutations in regulatory elements, says Meenakshi Ghosh, a structural biologist turned clinical scientist**

- Researcher Sascha Duttke seeks to understand how different cells interpret the same genome.
- He wonders if there are undiscovered biological rules.
- The human genome contains vital information about development, functioning, growth, and reproduction, occupying only about 2 MB of space.
- Duttke uses an analogy where the genome is a CD and the regulatory machinery is the CD player, with transcription factors as key components of the player.
- Transcription factors are proteins that bind to specific DNA portions and regulate the transcription rate from DNA to RNA.
- Duttke's groundbreaking research shows that a gene's transcription fate depends on the location of the transcription factor binding site relative to where transcription begins.
- The results, published in *Nature*, reveal how different spatial arrangements of the same transcription factors can produce varying effects.
- These findings can enhance genomic tools and algorithms that predict gene expression, aiding in new diagnostic and therapeutic strategies for diseases like cancers caused by regulatory mutations.
- Duttke was inspired by observing his toddler struggle with a puzzle, prompting him to consider the importance of spatial arrangements over just focusing on binding sites and protein interactions.

## **Before or after?**

- The team investigated whether the arrangement of transcription factors relative to the transcription start site influences gene expression.
- Activator transcription factors bind to specific points on DNA, known as binding sites, which are separate from the transcription start site.
- They developed tools to analyze patterns in DNA building blocks typically found at start sites.
- The team subjected specially cultured cells to RNA sequencing to detect binding sites in RNA.

- They identified preferred locations for transcription factor binding relative to active start sites.
- Binding sites for activator transcription factor NRF1 were found before the start site, while factor YY1's binding site was located after.
- NRF1 is solely an activator, whereas YY1 can act as both an activator and a repressor.
- The researchers examined how the relative position of the start site affected transcription factor behavior.
- Knocking down the gene for NRF1 resulted in decreased transcription only when NRF1's binding site was before the start site; if it was after, the absence of NRF1 increased transcription.
- Duttke noted the surprising nature of these results, as factors traditionally categorized as either activators or repressors could exhibit dual functions.
- The study also explored natural genetic variations at binding sites and their influence on transcription initiation.
- They analyzed over 4 million variations and 80,000 start sites in mouse cells, finding opposing transcription outcomes based on variations affecting factors before or after the start site.
- Mutations affecting NRF1 binding before the start site reduced transcription rates.
- The researchers synthetically inserted binding sites for six factors at varying distances from start sites in some DNA sequences.
- They observed similar position-dependent outcomes, such as NRF1 binding before the start increasing transcription, while binding after reduced transcription.

### **‘Spatial grammar’**

- The researchers studied the relevance of their findings to human diseases.
- They identified start sites from genomic sequences of 67 individuals and combined this with databases on disease risk linked to specific genetic variants.
- They observed position-dependent effects of disease-associated variants based on the location of start sites and binding sites.
- Duttke described the discovery of this spatial "grammar" as a eureka moment for scientists studying DNA instructions for gene regulation.
- The results have vast potential applications, including helping identify and predict disease-associated mutations (polymorphisms) that occur outside genes.
- Duttke noted that the contribution of many polymorphisms to disease is currently largely unknown, and the discovery of spatial grammar may help clarify this.
- Ghosh highlighted the study's importance, stating it provides crucial insights into how positioning and spacing relative to start sites impact gene expression.
- The findings may enhance understanding of evolution and how organisms regulate gene expression to adapt to environmental changes.

- Duttko expressed interest in exploring how this spatial grammar evolved and contributed to the complexity of organisms like humans.
- He quoted geneticist Theodosius Dobzhansky's 1973 essay title: "Nothing in biology makes sense except in the light of evolution."

## How ants free fall without incident

GS Paper III: Basic Science

**Q** get hurt when they fall. Why?

**A:** The fall of a body is controlled mainly by the gravitational attraction of the earth.

The strength of the gravitational force depends on the mass of the falling object. A heavier object is thus "attracted" more than a lighter object.

This attractive force is opposed by an upward thrust, or resistance, that is offered by air on the falling body.

The strength of the resistance depends among other things on the surface area of the object. If the surface area is greater, so is the resistance.

When any object falls through the air, these two forces compete with each other.

In the case of an ant, the force of gravity is almost completely balanced by the resistance offered by the air. Thus the ant is able to land safely.

In fact, if there is a wind blowing, the ants may just float away. But if a cluster of ants or a sufficiently large ant is forcibly hurled at the



The strength of the gravitational force depends on the mass of the falling object. DAVID HIGGINS/UNSPLASH

ground, they will get hurt.

This is how much we know from the laws and theories of physics about how ants fall through the air. Whether the ant actually gets hurt is another question entirely — and probably one that hasn't been answered so far.

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## How ants free fall without incident (9 October)

- Objects fall to the ground mainly due to gravitational attraction from the Earth.
- The strength of gravitational force depends on the mass of the falling object; heavier objects are attracted more than lighter ones.
- This attractive force is opposed by upward thrust or resistance from the air acting on the falling body.
- The strength of air resistance is influenced by the surface area of the object; larger surface areas result in greater resistance.
- As objects fall through the air, gravitational force and air resistance compete with each other.
- For an ant, the force of gravity is nearly balanced by air resistance, allowing it to land safely.
- If wind is blowing, ants may float away.
- However, if a cluster of ants or a large ant is thrown forcefully to the ground, they may get hurt.
- The physics of how ants fall is well understood, but whether ants actually feel pain from a fall remains an unanswered question.

# Sunset for the U.K.'s coal-fired power, lessons for India

GS Paper III: Environment

The shuttering of Britain's last coal-fired power plant, in Nottinghamshire, is a milestone and indicates the hastening of an ongoing paradigm shift in energy production globally. But this has by no means been a frictionless transition, as it has been portrayed in much of the press. There have also been calls to replicate the United Kingdom's coal phase-out globally. While Britain's experiment could hold good for a few developed economies, a far more tailor-made approach would be required for developing and least-developed nations.

Britain's coal phaseout must also not be viewed as beginning with its 2015 Paris pledge to bring down unabated coal-fired power to zero by 2025. It must largely begin with the disastrous Great Smog of London of 1952, leading to the enactment of environmental legislation such as the 1956 Clean Air Act and other protracted processes over a 70-year period, which included geo-political, environmental, economic and social pressures. The discovery of natural gas in the North Sea in 1965 and the desire to move away from coal imports from the Soviet Union at the height of the Cold War, as depleting domestic reserves made mining uneconomical, thereby jacking up costs of coal-fired energy production, collectively hastened the transition away from coal, which began almost 60 years ago. The subsequent forced closures of about 20 mines in the mid-1980s by the Margaret Thatcher government, despite a year-long miners' protest, led to blight and inter-generational poverty that some parts of the erstwhile coal-reliant regions of the U.K. continue to face. This is not to undermine the urgency with which nations must work toward drastically reducing their carbon emissions over the next two decades, but to appreciate and emphasise the vastly different trajectories and plans required to reach this goal.

Let us consider comparing India with the U.K.'s trajectory to achieving net zero emissions. At the 2021 Glasgow COP, India and China stood out seeking an amendment to the final declaration and having the phrase 'phasing down' and not 'phasing out' of coal introduced. India pledged to achieve net zero emissions by 2070 and meet half its energy needs from renewables by 2050.

## Cumulative emissions

India is the third largest carbon emitter, behind the United States and China, emitting about 2.9 gigatons in 2023, far ahead of the U.K.'s 384 million metric tonnes in the same year. But India's population is over 20 times that of the U.K. Moreover, India's per capita emissions were at 2 tonnes in 2023, less than half the global average of 4.6 tonnes and almost a third of the U.K.'s 5.5 tonnes in the same year.

An analysis by Carbon Brief that considered historical emissions of nations between 1850 and 2024 (till the closure of the Nottinghamshire plant), took into account their carbon footprint as colonial powers. This put the U.K. at fourth place, with emissions touching 10.4 billion tonnes,



Kunal Shankar

which Carbon Brief said was 'more than most countries ever produced from all sources'.

Britain built the earliest known public coal-fired power plant in 1882 in the heart of London near Fleet Street. Coal became the mainstay in Britain, powering homes, industries and businesses for well over half a century until the mid 1960s. Coal employment peaked in 1920, employing 1.2 million miners at about 3,000 mines nationwide. About a 100 small coal-fired power plants dotted the landscape at this time, supplying power to nearby towns and industrial areas. And, Britain dominated coal exports in the early 20th century accounting for 30% of global exports in 1913. The U.K.'s peak thermal power consumption was in the 1950s and 1960s, when 90% of energy was generated by coal, before steadily shifting to natural gas, nuclear and, more recently, wind and solar.

## India's coal story

India's first coal mine, the Raniganj coalfield, straddles present-day West Bengal and Jharkhand. While it was established as early as in 1774 by the British East India Company (and this is why historical CO<sub>2</sub> emissions matter), this led to large-scale coal extraction from much of India's eastern and central States of Jharkhand, West Bengal, Odisha, Chhattisgarh and Madhya Pradesh. India's first coal-fired power plant was the Hussain Sagar Thermal Power Station, established in 1920 in Hyderabad, during the Nizam's rule. It powered the twin cities of Hyderabad and Secunderabad well into the early 1980s. But it was not until 1956, when the Trombay power station near Mumbai was commissioned, that thermal power was truly heralded as India's mainstay. Moreover, the average age of India's coal-fired power plants is about 12 years, meaning they have a few decades before they could be decommissioned. While India has exported coal to neighbouring Myanmar and Sri Lanka, it has largely used its reserves for domestic power production. Of late, it has even been importing coal as power demand has been steadily rising.

India is yet to reach its peak coal production and consumption, which is expected between the years 2030-35, about 80 years since Britain reached this spot. About 70% of its energy output is currently from coal, accounting for 218 GW of installed capacity. It has more than 350 operational mines and about 120 new ones have been planned. A study by Global Energy Monitor estimates that these mines provide direct employment to almost 3,40,000 miners. This is likely an under-estimation as many from the agriculture sector are seasonal workers at mines. A Council on Energy, Environment and Water (CEEW) study estimates that India's thermal power plants employ about 4,00,000, people, again a likely under-estimation as informal employment at thermal power plants is high. This means that at its peak, about 10 years from now, the coal sector is likely to provide employment to well over a million people, which is about how

many miners alone worked in Britain more than a century ago.

Moreover, Britain's per capita energy consumption was almost three times India's in 2022, and this is despite the Russia-Ukraine war-induced energy austerity, and even as the world was at the tail end of the COVID-19 pandemic.

Having made the case that a direct comparison on coal phase-out between the two countries cannot be made, there are lessons that India could learn from the U.K.'s transition particularly in the past decade, and also ensure it does not make the mistakes Britain made in the 1980s and 1990s.

## Britain's transition

After committing to phasing out coal by 2025, when Britain had already reduced its use to a fifth of its energy needs, it pursued a holistic transition of not just the workforce of the sector but also the regions and communities that depended on it. Retraining programmes focused on sectors that required skills similar to those in coal mining and power generation such as engineering, heavy machinery operation and maintenance. This was mixed with early retirement and redundancy payments; new education and apprenticeship programmes, and community and regional redevelopment of historically coal-dependent regions, or impetus to set up new industries in their place. The sighting of renewable energy projects, particularly offshore wind farms close to major coal producing regions such as the North Sea off Yorkshire, and repurposing the existing grid infrastructure to transmit wind energy along with remodelling old coal-fired power plants for other forms of energy generation such as biomass in Drax, have helped alleviate some of the fears of job loss and economic slowdown. This is not to say concerns do not remain, but the gradual decline in coal, with growing awareness about climate change, and transparent, fixed timelines to transition, enabled Britain's coal phase-out. Outliers remain, like the protests at the now shuttered Talbot steel plant as the Tata-owned facility attempts to shift from coking coal to electric furnaces, but this might likely be a temporary closure.

While India has set itself a sufficient timeline of 45 more years to attain net zero emissions, there has already been a steady and impressive growth in renewables capacity. But coal-fired energy use also has risen, and the country must begin working on fixing timelines on plant decommissioning, regional redevelopment programmes, and retraining of miners and power plant workforces, bearing in mind that India's historically coal-dependent regions are some of the poorest in the country, and have workers who have largely transitioned from agriculture to mining. Only a holistic, transparent, and early forward planning approach, would hasten a transition that is inclusive and just.

India could learn from the U.K.'s transition, ensuring that it does not make the mistakes Britain made

# Sunset for the U.K.'s coal-red power, lessons for India (9 October)

- The closure of Britain's last coal-fired power plant in Nottinghamshire marks a significant milestone in global energy production shifts.
- The transition away from coal has not been without friction, despite media portrayals.
- Calls for global replication of the UK's coal phase-out need to consider tailored approaches for developing and least-developed nations.
- Britain's coal phase-out journey began long before its 2015 Paris pledge, tracing back to the Great Smog of London in 1952.
- The 1956 Clean Air Act and subsequent legislation emerged from a complex interplay of geopolitical, environmental, economic, and social pressures over 70 years.
- The discovery of natural gas in the North Sea in 1965 and the desire to reduce reliance on Soviet coal imports accelerated the transition away from coal.
- Economic factors, including the closure of unprofitable mines, contributed to this shift, especially during the Thatcher government in the mid-1980s, leading to poverty in former coal regions.
- While urgent action is needed to reduce carbon emissions globally, different nations require distinct strategies to achieve this goal.
- India, in contrast to the UK, sought a 'phasing down' of coal at the 2021 Glasgow COP, pledging to reach net zero emissions by 2070 and sourcing half its energy from renewables by 2050.
- India is the third largest carbon emitter, with emissions of about 2.9 gigatons in 2023, compared to the UK's 384 million metric tonnes.
- India's population is over 20 times that of the UK, leading to a per capita emission of 2 tonnes, which is less than half the global average of 4.6 tonnes and a third of the UK's 5.5 tonnes.
- An analysis by Carbon Brief highlights the UK's historical emissions from 1850 to 2024, placing it fourth overall, with emissions totaling 10.4 billion tonnes, more than most countries have produced.
- Britain built the earliest known public coal-fired power plant in 1882 near Fleet Street, London.
- Coal became essential in Britain, powering homes, industries, and businesses for over 50 years until the mid-1960s.
- Employment in coal peaked in 1920, with 1.2 million miners across about 3,000 mines.
- Around 100 small coal-fired power plants existed at this time, supplying power to nearby towns and industrial areas.
- Britain accounted for 30% of global coal exports in 1913, dominating the market.

- Peak thermal power consumption in the UK occurred in the 1950s and 1960s, with 90% of energy generated by coal.
- The UK's energy generation has since shifted to natural gas, nuclear, wind, and solar.
- India's coal history began with the Raniganj coalfield established in 1774 by the British East India Company.
- Large-scale coal extraction occurred in eastern and central states like Jharkhand, West Bengal, Odisha, Chhattisgarh, and Madhya Pradesh.
- India's first coal-fired power plant, Hussain Sagar Thermal Power Station, was established in 1920 in Hyderabad.
- The Trombay power station near Mumbai, commissioned in 1956, marked thermal power as India's primary energy source.
- The average age of India's coal-fired power plants is about 12 years, allowing for several decades before decommissioning.
- India has exported coal to Myanmar and Sri Lanka but primarily uses its reserves for domestic power production.
- India has begun importing coal due to rising power demand.
- India is projected to reach peak coal production and consumption between 2030-2035, about 80 years after Britain.
- Currently, 70% of India's energy output comes from coal, with 218 GW of installed capacity.
- India has over 350 operational mines and about 120 new ones planned.
- A Global Energy Monitor study estimates that these mines provide direct employment to nearly 340,000 miners.
- Many agricultural workers are seasonal miners, suggesting the employment figure may be an underestimation.
- A CEEW study estimates that India's thermal power plants employ about 400,000 people, likely underestimating informal employment.
- At peak production in about 10 years, the coal sector in India may employ over a million people, comparable to Britain's coal employment a century ago.
- In 2022, Britain's per capita energy consumption was nearly three times that of India, despite energy austerity from the Russia-Ukraine war and the aftermath of the COVID-19 pandemic.
- Direct comparisons between coal phase-outs in the UK and India are not appropriate, but India can learn valuable lessons from the UK's recent transition.
- Britain committed to phasing out coal by 2025, having already reduced its coal usage to a fifth of its energy needs.
- The UK pursued a holistic transition focusing on the workforce and communities dependent on coal.
- Retraining programs emphasized skills transferable to sectors like engineering and heavy machinery operation.

- The transition included early retirement and redundancy payments, along with new education and apprenticeship initiatives.
- Community redevelopment efforts targeted historically coal-dependent regions, encouraging new industries.
- Renewable energy projects, especially offshore wind farms near coal-producing areas, were developed alongside repurposing existing grid infrastructure for wind energy.
- Some old coal-fired plants, like Drax, were remodeled for biomass energy generation to mitigate job loss concerns.
- While fears of job loss and economic slowdown persist, a gradual decline in coal usage, awareness of climate change, and fixed transition timelines facilitated the UK's coal phase-out.
- Protests, such as those at the Talbot steel plant, highlight ongoing challenges during the transition, although some closures may be temporary.
- India has a timeline of 45 years to achieve net zero emissions, with significant growth in renewable energy capacity.
- However, coal-fired energy use has also increased, necessitating the establishment of timelines for plant decommissioning.
- India must implement regional redevelopment programs and retrain coal miners and power plant workers.
- Historically coal-dependent regions in India are among the poorest, with many workers having transitioned from agriculture to mining.
- An inclusive, transparent, and proactive planning approach is essential for a just and rapid transition away from coal.

# From solidarity to pseud, India's shift on Palestine

GS Paper II: India-West Asia

India's position on Palestine, once a symbol of its anti-colonial ethos, has been diluted since the end of the Cold War and has dramatically shifted over the past decade. The alignment with Israel, the marginalisation of Palestine, and a focus on transactional diplomacy are not isolated phenomena but interconnected trends shaped by an interplay of domestic and global factors.

## Hindutva and foreign policy

First, India's evolving policy on Palestine is inseparable from the rise of Hindutva. The Bharatiya Janata Party (BJP) and the Sangh Parivar have sought to influence India's diplomacy based on a Hindu nationalist worldview. This ideological shift has manifested itself in a growing affinity with Israel, seen as a natural partner against, and apparently a victim of, the perceived threat of an 'Islamic terror' – a narrative deeply ingrained in the Hindutva discourse.

Historically, India's support for Palestine was rooted in its anti-colonial struggle, self-determination, and anti-racism. However, in 'New India', this support is seen through a communal lens, where the Palestinian cause is linked exclusively with the Muslim identity. The public discourse, fuelled by right-wing media, frames pro-Palestinian protests and solidarity as a threat to national security and 'anti-nationalism'.

Protests supporting Palestine are often met with crackdowns, arrests, and even charges under the Unlawful Activities (Prevention) Act. Leaders such as Asaduddin Owaisi, who publicly voice support for Palestine, are routinely vilified, while students expressing solidarity are targeted. The state's tacit approval in delegitimising the Palestinian cause helps it align with Israel, not just diplomatically but also ideologically.

Prime Minister Narendra Modi's unscheduled stop at Mount Herzl to pay tribute to Theodore Herzl, the founder of Zionism, during his 2017 visit is emblematic of this ideological convergence. Under him, foreign policy is no longer framed by its historical commitments, but



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In these times of great power politics, the legacy ideals of non-alignment and anti-colonialism are seen as baggage

by a new narrative that views Israel as a strategic ally in a shared battle against perceived threats.

## Values or 'interests'?

The second factor driving India's shift is a transition from values-based to transactional diplomacy. During the Nehruvian era, India's foreign policy was deeply intertwined with anti-colonialism, including strong backing for Palestinian statehood. At the end of the Cold War, that ideological foundation began to give way to a more transactional approach, where narrowly defined interests took precedence over historical commitments. India-Israel relations are a product of this transition.

India's ties with Israel have flourished recently, with bilateral trade reaching over \$10 billion in 2022-23. Cooperation extends across sectors such as defence, agriculture, and technology, areas where Israel has become an invaluable partner. The renewed engagement is defined by the dual pillars of 'dehyphenation', treating India's relations with Israel and Palestine as separate, and 'depoliticisation', enhancing cooperation by circumventing politically sensitive questions. To dehyphenate and depoliticise are political acts. This allows New Delhi to deepen its engagement with Israel while paying lip service to the Palestinian cause.

However, this shift towards transactional diplomacy is not unique to India. Globally, foreign policies are increasingly guided by constructed economic and strategic interests. In India's case, the West Asia policy has evolved significantly since the 1990s, with energy security, diaspora, and investments taking centre stage. The old Non-Aligned paradigm, which once governed India's position, is now seen as inadequate for pursuing these objectives.

India's approach to Palestine reflects this trend. As the government focuses on attracting investments from the Gulf and forging new partnerships, the Palestinian issue, lacking immediate economic or strategic benefits, has been relegated to the margins. The shift is stark when contrasted with Jawaharlal Nehru and

Indira Gandhi's India which saw support for Palestine as a moral duty.

## Ambitions and the great game

Finally, India's aspiration to emerge as a great power has also played a crucial role. While it is flirting to emerge as a broker in the Ukraine conflict, it is simultaneously abdicating its support for Palestine. India's alignment with the U.S., Israel's staunchest ally, amidst the China-U.S. contest across various theatres, including West Asia is also a contributing factor.

In these times of great power politics, the legacy ideals of non-alignment and anti-colonialism are seen as baggage. This is best reflected in the rhetorical shift from non-alignment to strategic autonomy to multialignment. While the operational essence remains the same, every rebranding has witnessed normative dilution. This is evident in India's muted response to Israel's war on Gaza.

Despite the extensive loss of life and destruction, New Delhi's reaction has been limited to (non) statements calling for peace and dialogue. The focus remains on strengthening ties with Israel, securing defence partnerships, and leveraging other sectoral opportunities.

The rise of Hindutva, transactional diplomacy, and India's strategic ambitions in the context of the China-U.S. rivalry have all contributed to the marginalisation of the Palestinian cause.

While official rhetoric may still endorse a two-state solution, the reality on the ground reveals a distinct shift towards strengthening ties with Israel and prioritising economic and strategic interests over normative commitments.

In this new era of international politics, India seems to have moved away from its role as a champion of anti-colonial struggles. Instead, it has embraced a path defined by narrow interests over values. As the global order continues to evolve, will India continue down a path that increasingly aligns it with power politics over principles?

As it stands, the 'new' international order will likely be the same game with just new players.

## From solidarity to pseud, India's shift on Palestine (9 October)

- India's stance on Palestine, historically tied to its anti-colonial ethos, has shifted significantly since the end of the Cold War and over the past decade.
- Trends of alignment with Israel, marginalization of Palestine, and a focus on transactional diplomacy are interconnected and influenced by domestic and global factors.
- The rise of Hindutva has greatly impacted India's foreign policy regarding Palestine.

- The BJP and Sangh Parivar have shaped India's diplomacy through a Hindu nationalist worldview, fostering a growing affinity with Israel.
- This alignment is seen as a response to the perceived threat of 'Islamic terror,' a narrative prevalent in Hindutva discourse.
- India's historical support for Palestine was based on anti-colonial struggle, self-determination, and anti-racism.
- In contemporary India, support for Palestine is increasingly viewed through a communal lens, associating the Palestinian cause primarily with Muslim identity.
- Right-wing media frames pro-Palestinian protests as threats to national security and labels them 'anti-national.'
- Protests supporting Palestine often face crackdowns, arrests, and charges under the Unlawful Activities (Prevention) Act.
- Political figures like Asaduddin Owaisi, who advocate for Palestine, are vilified, and students expressing solidarity face targeting.
- The state's tacit approval of delegitimizing the Palestinian cause aligns it more closely with Israel, both diplomatically and ideologically.
- Prime Minister Narendra Modi's tribute to Theodore Herzl during his 2017 visit to Israel symbolizes this ideological convergence.
- Under Modi, foreign policy is reframed to view Israel as a strategic ally in combating perceived threats, moving away from historical commitments.

### **Values or 'interests'?**

- India's shift towards a new stance on Palestine is driven by a transition from values-based diplomacy to transactional diplomacy.
- During the Nehruvian era, India's foreign policy was closely linked to anti-colonialism, with strong support for Palestinian statehood.
- After the Cold War, this ideological foundation shifted towards a more transactional approach, prioritizing narrowly defined interests over historical commitments.
- India-Israel relations have blossomed as a result of this transition.
- Bilateral trade between India and Israel exceeded \$10 billion in 2022-23, with cooperation in sectors like defense, agriculture, and technology.
- The renewed engagement is characterized by two main pillars: 'dehyphenation' (treating relations with Israel and Palestine as separate) and 'depoliticisation' (enhancing cooperation while avoiding politically sensitive issues).
- These strategies allow New Delhi to deepen its engagement with Israel while superficially acknowledging the Palestinian cause.
- The shift towards transactional diplomacy is not unique to India; many countries are increasingly guided by constructed economic and strategic interests.
- India's West Asia policy has evolved significantly since the 1990s, focusing on energy security, diaspora, and investments.

- The old Non-Aligned paradigm is viewed as inadequate for achieving current objectives.
- India's approach to Palestine reflects this trend, as the government prioritizes attracting Gulf investments and forging new partnerships.
- The Palestinian issue has been sidelined due to a lack of immediate economic or strategic benefits, contrasting sharply with the moral duty emphasized by Nehru and Indira Gandhi's India.

## **Ambitions and the great game**

- India's aspiration to emerge as a great power has significantly influenced its foreign policy regarding Palestine.
- While seeking to act as a broker in the Ukraine conflict, India has diminished its support for Palestine.
- India's alignment with the U.S., a key ally of Israel, amidst the China-U.S. rivalry in various regions, including West Asia, contributes to this shift.
- Legacy ideals of non-alignment and anti-colonialism are increasingly viewed as burdens in contemporary power politics.
- The rhetorical shift from non-alignment to strategic autonomy and then to multialignment reflects this change, resulting in normative dilution.
- India's muted response to Israel's actions in Gaza highlights this shift, with calls for peace and dialogue lacking substantive action.
- The focus remains on strengthening ties with Israel, enhancing defense partnerships, and exploring other economic opportunities.
- The rise of Hindutva, the transition to transactional diplomacy, and India's strategic ambitions amid the China-U.S. contest have marginalized the Palestinian cause.
- Official rhetoric may still support a two-state solution, but actual policies favor strengthening relations with Israel and prioritizing strategic interests.
- India appears to have moved away from its historical role as a champion of anti-colonial struggles, opting for a path focused on narrow interests.
- The evolving global order suggests India may continue aligning with power politics rather than adhering to its foundational principles.
- Ultimately, the new international order may replicate previous dynamics with different players.

## **Flipping scripts (9 October)**

### **BJP and INDIA bloc emerge clear winners in Haryana and J&K**

- Contrary to predictions, the BJP retained power in Haryana, increasing its seats from 40 to 48 and its vote share from 36.5% to 39.9%.

- The Congress also improved its vote share, rising 11 points to 39.1%, but its seat count increased marginally to 37.
- Regional parties, INLD and JJP, performed poorly, with their combined vote share dropping from 21% in 2019 to 7% in 2024, benefiting the Congress.
- The BJP's social engineering strategy, gaining support from non-Jat OBCs and leveraging its strengths in urban areas, contributed to its success.
- The BJP faced anti-incumbency and a resurgent Congress, but the latter's rural success was insufficient to disrupt BJP's urban strongholds.
- The Congress's internal division and leadership issues hindered its performance.
- The BJP's victory enhances its central leadership's standing after a disappointing performance in the 2024 general election.
- The Congress needs to rethink its strategy to challenge the BJP in the Hindi heartland.
- In Jammu and Kashmir, the BJP increased its vote share by five points to 45%, winning 29 seats in Hindu-majority Jammu.
- The National Conference-Congress alliance (INDIA bloc) won four seats reserved for Scheduled Tribes.
- In the Kashmir Valley, the INDIA bloc won 41 out of 47 seats, significantly reducing the PDP to three seats.
- The INDIA bloc's success in Jammu and dominance in Kashmir resulted in a decisive majority of 49 seats.
- The BJP's strategy of isolating mainstream politics in Kashmir and using delimitation failed, as voters favored strong opposition, particularly in the Valley.
- CM-designate Omar Abdullah faces challenges, primarily seeking statehood for J&K.
- An empowered government with popular support could enhance peace prospects in the conflict-prone region.
- The BJP-led Centre should respect the mandate and allow the new government to function effectively and fulfill its promises.

## Deep roots

### Physics Nobel Prize acknowledges the diverse foundations of AI

For an idea whose time has come, look no further than artificial neural networks (ANNs) and machine learning, the 2024 Nobel Prize in Physics seems to suggest. John J. Hopfield and Geoffrey E. Hinton have been honoured “for foundational discoveries and inventions that enable machine learning with artificial neural networks”. The foundations of ANNs are rooted in various branches of science, including statistical physics, neurobiology, and cognitive psychology, and artificial intelligence (AI) has become a household term today by drawing on such disparate insights. ANNs are networks of neurons (or processing centres) designed to operate like those in animal brains. In 1982, Hopfield, a towering figure in biological physics, introduced an ANN called the Hopfield network. Each neuron in this network is connected to all the others, and the flow and weight of information are not preferential to one direction. The neurons can process some input using Hebbian learning (“neurons that fire together, wire together”). The network as a whole was programmed to be analogous to a group of atoms, each with some magnetic energy. When ‘activated’, the ANN could receive, for instance, a noisy image and dynamically denoise it by minimising the analogous magnetic energy of the system. Similarly, the Boltzmann machine was an earlier model for a spin glass – a material in which roughly half of atom pairs have their quantum spins aligned while the other half have them anti-aligned. This disorder causes the material to be frustrated and minimise its energy through more configurations than if the disorder was absent. Alongside Terrence Sejnowski, Hinton popularised the use of Boltzmann machines for cognitive tasks, building on Hopfield’s work to enable them to classify data based on similarity or generate new patterns from old ones, again by having the ANN minimise the value of an energy function.

The ubiquity of AI owes much to the robust theoretical foundations laid by this year’s physics laureates and many others, drawing on mathematical, physical, and biological insights that few could have imagined would pave the way for AI. Herein lies a sting in the tail for India. Due to decades of low funding, inefficient governance, and inadequate attempts to reconcile the needs of science with bureaucratic processes, blue-sky research has often been a casualty of sudden and often transient bouts of consolidation and reform. Resource constraints may require researchers to conduct research as well as teach, guide, and administer. But as this year’s physics Nobel demonstrates, dismissing blue-sky research altogether is also to forfeit opportunities in technology that Indians may not even be aware of.

## Deep roots (9 October)

### Physics Nobel Prize acknowledges the diverse foundations of AI

- The 2024 Nobel Prize in Physics was awarded to John J. Hopfield and Geoffrey E. Hinton for foundational discoveries in machine learning using artificial neural networks (ANNs).
- ANNs are inspired by various scientific disciplines, including statistical physics, neurobiology, and cognitive psychology.
- ANNs function similarly to neurons in animal brains, processing information through interconnected nodes.
- Hopfield introduced the Hopfield network in 1982, where each neuron is connected to all others, allowing for bidirectional flow of information.
- The network can use Hebbian learning, encapsulated in the phrase “neurons that fire together, wire together,” to process inputs.
- When activated, ANNs can perform tasks such as denoising images by minimizing the system’s analogous magnetic energy.
- The Boltzmann machine is another model that represents a spin glass, minimizing energy through various configurations due to atomic disorder.
- Hinton, alongside Terrence Sejnowski, advanced the use of Boltzmann machines for cognitive tasks, enabling data classification and pattern generation.
- The development of AI has heavily relied on the robust theoretical foundations established by this year’s Nobel laureates and others.
- India’s challenges include decades of low funding, inefficient governance, and a lack of integration between scientific needs and bureaucratic processes.
- These issues have led to neglect of blue-sky research, which is crucial for advancing technology and scientific innovation.

# What does USCIRF report say about India

What is the mandate of the United States Commission on International Religious Freedom? How does the USCIRF designate a country as a 'Country of Particular concern'? How has the Indian government reacted to the report?

GS Paper II: IR

## EXPLAINER

G. Sampath

### The story so far:

The Washington DC-based United States Commission on International Religious Freedom (USCIRF) on October 2 released a country update on India, flagging "collapsing religious freedom conditions". Among other things, the report highlighted how throughout 2024, individuals from minority communities have been killed and lynched by vigilante groups, religious leaders have been arbitrarily arrested, and places of worship have been demolished. The Indian government has rejected the report as coming from a "biased organisation".

### What is the USCIRF?

The USCIRF is an independent, bipartisan U.S. federal government agency created under the 1998 International Religious Freedom Act (IRFA). It monitors the universal right to freedom of religion or belief (FoRB) in countries other than the U.S. Its assessments of countries are based on international human rights standards, and in particular, Article 18 of the Universal Declaration of Human Rights, which states, "Everyone has the right to freedom of thought, conscience and religion; this right includes freedom to change his religion or belief, and freedom, either alone or in community with others and in public or private, to manifest his religion or belief in teaching, practice, worship and observance."

The USCIRF is distinct from the Office of International Religious Freedom (IRF), which is part of the U.S. State Department. The IRF also releases annual reports on religious freedom. While the USCIRF's reports could have a bearing on a country's image, the IRF's stance is more consequential for bilateral relations.

### What does the USCIRF do?

As per its mandate under the IRFA, the



In protest: Activists burn a copy of the Citizenship Amendment Act (CAA) in Kolkata on March 12. AFP

USCIRF monitors religious freedom conditions across the world through travel, research and meetings with representatives of international human rights groups, NGOs, victims of persecution, and foreign officials with the aim of putting out a report every year, listing the countries that meet the threshold for designation by the U.S. State Department as a "Country of Particular concern" (CPC). It also shares another list of countries that, in its assessment, ought to be included in the State Department's 'Special Watch List' (SWL).

Countries that "commit systematic, ongoing, and egregious violations of religious freedom" would be designated as a CPC. Countries "whose governments engage or tolerate in severe religious freedom violations, but do not rise to the CPC standard of "systematic, ongoing,

and egregious" would be included in the SWL. If the U.S. State Department accepts the USCIRF's recommendation and designates a country as a CPC, then under the IRFA, it has a range of policy options, including sanctions, to address such kind of violations.

### What does USCIRF's country update on India state?

The report, authored by Sema Hasan, Senior Policy Analyst with the USCIRF, says that religious freedom in India in 2024 has been on a "deteriorating and concerning trajectory". It stated that the Indian government, through legislations such as the Citizenship (Amendment) Act, 2019 for which the rules were published in May this year, and "through the enforcement of discriminatory legislation like anti-conversion laws, cow slaughter

laws, and antiterrorism laws", continued to "repress and restrict" religious minorities. It also details how "Indian officials have repeatedly employed hateful and derogatory rhetoric and misinformation to perpetuate false narratives about religious minorities, inciting widespread violence, lynchings, and demolition of places of worship." In its 2024 annual report, the USCIRF designated India as a CPC.

### How did India respond?

Spokesperson of the Ministry of External Affairs Randhir Jaiswal rejected the report, stating, "Our views on the USCIRF are well known. It is a biased organisation with a political agenda. It continues to misrepresent facts and peddles a motivated narrative about India. We reject this malicious report, which only serves to discredit USCIRF further." He further added, "We would urge USCIRF to desist from such agenda-driven efforts."

### Is the USCIRF 'biased' and 'agenda-driven'?

Its reports are backed by research and numerous citations sourced from credible domestic and international media, besides direct testimonies. In the case of the country update on India, there is no evident instance of misrepresented facts, with every claim backed by publicly verifiable documentation. However, the timing of this update has raised eyebrows, and opened it up to concerns such as those voiced by the MEA, about the report being "agenda-driven".

The USCIRF, as a body that works with the U.S. government, and notwithstanding its 'independent' status, is considered by many countries as a tool of U.S. foreign policy.

### Are the USCIRF's recommendations binding?

No, they are not. It is up to the U.S. State Department whether or not to accept them, and typically, calculations related to bilateral relations and larger foreign policy goals come into play.

## THE GIST

The USCIRF is an independent, bipartisan U.S. federal government agency created under the 1998 International Religious Freedom Act (IRFA). It monitors the universal right to freedom of religion or belief (FoRB) in countries other than the U.S.

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Spokesperson of the Ministry of External Affairs Randhir Jaiswal rejected the report, stating, "Our views on the USCIRF are well known. It is a biased organisation with a political agenda".

- Resource constraints often force researchers to balance research with teaching and administrative responsibilities.
- Ignoring blue-sky research could result in missed opportunities for technological advancements that may not be immediately recognized.

## What does USCIRF report say about India? (9 October)

## **What is the mandate of the United States Commission on International Religious Freedom? How does the UNSCIRF designate a country as a ‘Country of Particular concern’? How has the Indian government reacted to the report?**

- The United States Commission on International Religious Freedom (USCIRF) released a country update on India on October 2, citing "collapsing religious freedom conditions."
- The report noted incidents of killings and lynchings of minority community members, arbitrary arrests of religious leaders, and the demolition of places of worship throughout 2024.
- The Indian government has dismissed the report as originating from a "biased organisation."
- The USCIRF is an independent, bipartisan U.S. federal agency created under the 1998 International Religious Freedom Act (IRFA).
- It monitors the right to freedom of religion or belief (FoRB) in countries outside the U.S., based on international human rights standards, particularly Article 18 of the Universal Declaration of Human Rights.
- The USCIRF is separate from the Office of International Religious Freedom (IRF) within the U.S. State Department, which also releases annual reports on religious freedom.
- The USCIRF aims to provide assessments that may affect a country's image, while the IRF's stance is more impactful for bilateral relations.
- Under its mandate, the USCIRF conducts research and meetings to monitor religious freedom globally and publishes an annual report.
- The report lists countries that qualify for designation as a "Country of Particular Concern" (CPC) by the U.S. State Department.
- It also recommends countries for the State Department's "Special Watch List" (SWL).
- Countries designated as CPCs commit "systematic, ongoing, and egregious violations of religious freedom."
- Those included in the SWL have severe violations but do not meet the CPC standard.
- If the State Department accepts the USCIRF's recommendations for CPC designation, it has policy options, including sanctions, to address violations.

## **What does USCIRF’s country update on India state?**

- The USCIRF report, authored by Sema Hasan, states that religious freedom in India in 2024 is on a "deteriorating and concerning trajectory."
- It claims the Indian government uses legislation such as the Citizenship (Amendment) Act, 2019, and discriminatory laws like anti-conversion laws, cow slaughter laws, and anti-terrorism laws to repress religious minorities.

- The report details how Indian officials have used hateful rhetoric and misinformation to perpetuate false narratives about religious minorities, inciting violence, lynchings, and the demolition of places of worship.
- In its 2024 annual report, the USCIRF designated India as a "Country of Particular Concern" (CPC).
- The Indian Ministry of External Affairs spokesperson, Randhir Jaiswal, rejected the report, calling the USCIRF a biased organization with a political agenda.
- Jaiswal accused the USCIRF of misrepresenting facts and urged it to stop agenda-driven efforts.
- The USCIRF's reports are supported by research and citations from credible media and direct testimonies, with claims backed by publicly verifiable documentation.
- Concerns about the report being "agenda-driven" have been raised, particularly regarding its timing.
- The USCIRF is seen by many countries as a tool of U.S. foreign policy, despite its independent status.
- The recommendations made by the USCIRF are not binding; it is up to the U.S. State Department to decide whether to accept them, influenced by bilateral relations and foreign policy goals.

# Why is the textile industry struggling to perform better?

What caused the slump in the Indian textile sector in the last two financial years?

## GS Paper III: Industry

The story so far:

Union Minister for Textiles Giriraj Singh recently said that the Indian textile and apparel sector is aiming for a total business of \$350 billion annually by 2030, which is to generate 3.5 crore jobs. However, the industry went through a tumultuous phase during the last two financial years, casting a shadow on the possibility for 10% CAGR.

What is the status now?

The size of the Indian textile and apparel industry was estimated to be \$153 billion in 2021, with almost \$110 billion contributed by domestic business. In FY22, India was the third largest textile exporter globally, enjoying a 5.4% share. India is also said to have the second largest manufacturing capacity, with a robust capability across the value chain. The sector's contribution to GDP is close to 2.3% (FY21) and 10.6% of total

manufacturing Gross Value Added (GVA) in FY23. About 105 million people are employed by the textile and garment units, directly and indirectly. For an industry that has 80% of its capacity spread across MSMEs and is sensitive to international developments as it is strongly linked to global markets, FY2021-2022 saw tremendous growth with \$43.4 billion exports.

However, slowdown in demand that started in 2022-2023 only worsened in FY24 with a slump in exports and domestic demand. This impacted manufacturing clusters severely. For instance, Tamil Nadu, which has the largest spinning capacity in the country, saw the closure of nearly 500 textile mills in the last two years. In Tiruppur, which is a knitwear production destination, many units saw a 40% drop in business in FY23.

Why did exports slump?

Geopolitical developments and a slump in demand in buying countries hit the exporting units. This was exacerbated by

high raw material prices of both, cotton and Man Made Fibres (MMF), and the growing import of fabrics and garments.

The imposition of a 10% import duty on cotton has made Indian cotton more expensive compared to international prices. In the case of MMF, introduction of quality control orders has disturbed raw material availability and price stability. The industry is repeatedly demanding removal of the import duty on cotton at least during the off-season months of April to October. "This is an industry in which the stakeholders compete in the international market with countries that heavily support their domestic production capabilities. So, India needs schemes that run for at least five years and boost investments. Raw material should be available for the domestic industry at internationally competitive prices," says a spokesperson of a leading industry association.

What are the other challenges?

Apart from policy issues, the industry is

also staring at disruptions in its traditional business systems. Direct retailing to customers through e-commerce is a trend that is catching on among garment and home textile manufacturers, with more startups entering this space. A report by Wazir Advisors notes that "(Foreign) brands are fast-tracking the adoption of ESG sustainability across the supply chain." They are defining their sustainability targets and want to source from vendors who will meet these targets. Further, there is a rise in comfort wear, loungewear, and athleisure as the emphasis on comfortable clothing has increased among consumers. "Even in the domestic market, much has changed in the way business is done. Customers in rural and semi-urban areas prefer to shop in multi-brand outlets or hyper markets. They do not want to step into outlets of less known brands," said Palanisamy, a basic garment producer in Tiruppur.

What next?

The industry is looking at a \$100 billion investment across various segments of the value chain by 2030 to augment production capacities and meet the \$350 billion target. Labour constitutes roughly 10% of the production cost in the textile sector. The average daily wage of a trained textile worker is reported to be ₹550 a day. Unskilled workers earn about ₹450 a day. The industry has no option but to look at technology and skilling of its workforce to improve productivity and reduce wastages, say industry sources.

## THE GIST

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# Why is the textile industry struggling to perform better? (9 October)

## What caused the slump in the Indian textile sector in the last two financial years?

- Union Minister for Textiles Giriraj Singh announced that the Indian textile and apparel sector aims for a total business of \$350 billion annually by 2030, intending to generate 3.5 crore jobs.
- The industry experienced a tumultuous phase in the last two financial years, affecting the possibility of achieving a 10% CAGR.
- The Indian textile and apparel industry was estimated at \$153 billion in 2021, with nearly \$110 billion from domestic business.
- In FY22, India was the third-largest textile exporter globally, holding a 5.4% market share.
- India has the second-largest manufacturing capacity in the sector, with strong capabilities across the value chain.
- The textile sector contributed close to 2.3% to GDP in FY21 and 10.6% of total manufacturing Gross Value Added (GVA) in FY23.
- Approximately 105 million people are employed directly and indirectly in textile and garment units.
- The industry comprises 80% MSMEs and is sensitive to international developments due to its link to global markets.
- FY2021-2022 saw significant growth with \$43.4 billion in exports.
- A slowdown in demand that began in 2022-2023 worsened in FY24, leading to a slump in exports and domestic demand.
- Tamil Nadu, the state with the largest spinning capacity, experienced the closure of nearly 500 textile mills in the last two years.
- Tiruppur, a key knitwear production hub, saw a 40% drop in business in FY23.
- Exports slumped due to geopolitical developments and reduced demand from buying countries, coupled with high raw material prices for cotton and Man Made Fibres (MMF).
- The imposition of a 10% import duty on cotton increased Indian cotton prices compared to international rates.
- Quality control orders for MMF disrupted raw material availability and price stability.
- The industry is calling for the removal of the import duty on cotton during off-season months (April to October).
- Industry stakeholders emphasize the need for long-term schemes to boost investments and ensure raw material availability at competitive prices.

## What are the other challenges?

- The Indian textile industry faces disruptions in traditional business systems.
- Direct retailing through e-commerce is gaining traction among garment and home textile manufacturers, with new startups entering the space.
- A report by Wazir Advisors indicates that foreign brands are rapidly adopting ESG sustainability across their supply chains.
- Brands are defining sustainability targets and seeking vendors who can meet these standards.
- There is an increasing demand for comfort wear, loungewear, and athleisure, reflecting consumer preferences for comfortable clothing.
- In the domestic market, shopping habits have changed; customers in rural and semi-urban areas prefer multi-brand outlets or hypermarkets over lesser-known brand outlets, according to Palanisamy, a garment producer in Tiruppur.
- The industry aims for a \$100 billion investment across various segments of the value chain by 2030 to enhance production capacities and meet the \$350 billion target.
- Labour costs make up about 10% of production costs in the textile sector.
- The average daily wage for a trained textile worker is approximately ₹550, while unskilled workers earn about ₹450 a day.
- The industry must focus on technology and workforce skilling to improve productivity and reduce wastage.



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# Global Digital Compact: advancing digital innovation in a sustainable fashion

The GDC is a diplomatic instrument which focuses on the potential of digital technologies, with the specific intention to harness and regulate them for the common good. The GDC rests on the idea that digital technologies are dramatically changing our world

GS Paper II: Global Governance

Krishna Ravi Srinivas

In the recently concluded ‘Summit of the Future’ organised by the United Nations, member countries adopted the ‘Global Digital Compact’ (GDC). This ambitious instrument is perhaps the first of its kind in the international arena focusing on the potential of digital technologies, with the specific intention to harness and regulate them for the common good.

## What is the GDC?

The GDC is not a binding law but a diplomatic instrument with a set of shared goals for governments, institutions, firms, and other stakeholders to bear in mind. Once there is greater adherence, the terms of the compact may become soft laws in each country.

Earlier, the UN helped pilot and legitimise two other compacts: the ‘Global Compact’ (“a voluntary initiative based on CEO commitments to implement universal sustainability principles and to take steps to support UN goals”) and the ‘Global Compact for Safe, Orderly, and Regular Migration’ (covering all dimensions of international migration in a holistic and comprehensive manner).

The GDC rests on the idea that digital technologies are dramatically changing our world. While they offer potential benefits for societies and for our planet – by enabling Sustainable Development Goals (SDGs) – they also pose serious challenges and concerns.

## Realising the GDC

The GDC is a collaborative project with the objective of ensuring human oversight of technologies in ways that advance sustainable development. Building on the norms of international law, the Universal Declaration of Human rights, and the UN 2030 Agenda, among others, the GDC

proposes global cooperation in the governance of data and digital technologies

To meet the Compact’s goals, UN member countries have committed to establish two panels – an ‘Independent International Scientific Panel on AI [Artificial Intelligence]’ and a panel for ‘Global Dialogue on AI Governance’.

These goals include closing the digital divide, including everyone in the digital economy, improving access to data, and advancing responsible and equitable data governance. In the same vein, the Compact’s principles are based on inclusive participation, access to data and digital technologies, sustainability, and trustworthy technologies that function within a free and competitive market.

## Digital goods and services

To address the digital divide, the GDC proposes “digital public goods” that will include open-source software, open data, and open AI models, plus adherence to privacy and best practices.

This is an acknowledgment of digital public goods’ ability to drive social change as elements of a “digital public infrastructure” that delivers services. Such infrastructure involves the development and use of shared digital systems according to specific priorities and needs of stakeholders. To this end, the GDC envisions partnerships, including with private entities.

## What are the GDC’s lacunae?

First, the extensive European experience with public-private partnerships vis-à-vis digital projects suggests openness within such partnerships is restricted between ‘as open as is required’ and ‘as closed as is essential’. In other words, openness in the context of the digital public infrastructure may be limited by contractual requirements such as non-disclosure, confidentiality, and

protection of intellectual property.

Second, the GDC adds little to existing frameworks of internet governance but importantly it calls for digital technology companies to self-regulate to keep their users safe and their users’ trust. This is not an optimum solution because self-regulation has already proved to be ineffective in practice.

Third, the GDC recognises interoperable data governance as essential to foster innovation and promote economic growth. But experts have noted that the increasing collection, sharing, and processing of data – particularly for AI – may amplify risks in the absence of effective personal data protection and privacy laws.

Fourth, the Compact stresses on achieving SDGs within a paradigm where governments and private entities track, collect, and analyse data to measure progress, while underscoring the importance of governing data in the public interest. For this the Compact proposes to give corporate entities more power in data and internet governance. However, it fails to emphasise the countervailing measures required to stave off monopolistic control.

## The GDC and the UN

In many sections the GDC makes wishful statements that bypass the complexity of underlying issues, assuming the comity of nations will be enough to achieve its objectives. But this stance may also reflect the UN’s wish to remain a major player in governing technologies, including AI.

For example, in the 21st century data is oil: it is as valuable even as its use is embedded in extractive industries with polluting effects. Consider the ongoing explosive growth of generative AI models and the spheres, volumes, and varieties of data collected to train them. The GDC acknowledges issues in AI governance but has little to offer in terms of concrete

solutions or even strategies.

Similarly, the GDC does bat for “data flow with trust” but many countries have refused to accept this idea because it goes against the spirit of digital sovereignty. Some even have specific laws that require data about their citizens to remain within their borders.

Finally, the GDC links various objectives and proposed actions with the relevant SDGs. This is a welcome move because it reflects the view that digitisation should play a prominent role in realising the SDGs. At the same time, when the SDGs were adopted in 2015, the current AI revolution hadn’t started. Given the unimpressive record of nations in realising the SDGs, it is doubtful whether an add-on Compact like the GDC could make a difference.

The UN’s member states are striving to find ways to work with and regulate Big Tech while also asserting their digital sovereignty. The global governance of digital technologies thus is too complex to be captured or ‘fixed’ by a singular entity like the GDC. We need multilateral as well as regional negotiations to go with it to address jurisdictional, regional, and/or local needs. By appealing to existing modes of digital governance as well as by combining SDGs with digitalisation, the GDC is positioning itself as an instrument of brainstorming rather than as a provider of roadmaps. Still, the GDC can help with capacity building and with South-South and North-South collaborations in the development of digital public goods.

In sum, the GDC may not result in a paradigm shift in the world’s governance of digital technologies but it can facilitate significant and tangible outcomes if member states take it seriously.

*Neethu Rajam is Associate professor of intellectual property and technology law, National Law University Delhi. Krishna Ravi Srinivas is Adjunct professor of law, NALSAR University of Law Hyderabad.*

# Global Digital Compact: advancing digital innovation in a sustainable fashion

The GDC is a diplomatic instrument which focuses on the potential of digital technologies, with the specific intention to harness and regulate them for the common good. The GDC rests on the idea that digital technologies are dramatically changing our world

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## What is the GDC?

The GDC is not a binding law but a diplomatic instrument with a set of shared goals for governments, institutions, firms, and other stakeholders to bear in mind. Once there is greater adherence, the terms of the compact may become soft laws in each country.

Earlier, the UN helped pilot and legitimise two other compacts: the 'Global Compact' ("a voluntary initiative based on CEO commitments to implement universal sustainability principles and to take steps to support UN goals") and the 'Global Compact for Safe, Orderly, and Regular Migration' (covering all dimensions of international migration in a holistic and comprehensive manner).

The GDC rests on the idea that digital technologies are dramatically changing our world. While they offer potential benefits for societies and for our planet – by enabling Sustainable Development Goals (SDGs) – they also pose serious challenges and concerns.

## Realising the GDC

The GDC is a collaborative project with the objective of ensuring human oversight of technologies in ways that advance sustainable development. Building on the norms of international law, the Universal Declaration of Human rights, and the UN 2030 Agenda, among others, the GDC

proposes global cooperation in the governance of data and digital technologies

To meet the Compact's goals, UN member countries have committed to establish two panels – an 'Independent International Scientific Panel on AI [Artificial Intelligence]' and a panel for 'Global Dialogue on AI Governance'.

These goals include closing the digital divide, including everyone in the digital economy, improving access to data, and advancing responsible and equitable data governance. In the same vein, the Compact's principles are based on inclusive participation, access to data and digital technologies, sustainability, and trustworthy technologies that function within a free and competitive market.

## Digital goods and services

To address the digital divide, the GDC proposes "digital public goods" that will include open-source software, open data, and open AI models, plus adherence to privacy and best practices.

This is an acknowledgment of digital public goods' ability to drive social change as elements of a "digital public infrastructure" that delivers services. Such infrastructure involves the development and use of shared digital systems according to specific priorities and needs of stakeholders. To this end, the GDC envisions partnerships, including with private entities.

## What are the GDC's lacunae?

First, the extensive European experience with public-private partnerships vis-à-vis digital projects suggests openness within such partnerships is restricted between 'as open as is required' and 'as closed as is essential'. In other words, openness in the context of the digital public infrastructure may be limited by contractual requirements such as non-disclosure, confidentiality, and

protection of intellectual property.

Second, the GDC adds little to existing frameworks of internet governance but importantly it calls for digital technology companies to self-regulate to keep their users safe and their users' trust. This is not an optimum solution because self-regulation has already proved to be ineffective in practice.

Third, the GDC recognises interoperable data governance as essential to foster innovation and promote economic growth. But experts have noted that the increasing collection, sharing, and processing of data – particularly for AI – may amplify risks in the absence of effective personal data protection and privacy laws.

Fourth, the Compact stresses on achieving SDGs within a paradigm where governments and private entities track, collect, and analyse data to measure progress, while underscoring the importance of governing data in the public interest. For this the Compact proposes to give corporate entities more power in data and internet governance. However, it fails to emphasise the countervailing measures required to stave off monopolistic control.

## The GDC and the UN

In many sections the GDC makes wishful statements that bypass the complexity of underlying issues, assuming the comity of nations will be enough to achieve its objectives. But this stance may also reflect the UN's wish to remain a major player in governing technologies, including AI.

For example, in the 21st century data is oil: it is as valuable even as its use is embedded in extractive industries with polluting effects. Consider the ongoing explosive growth of generative AI models and the spheres, volumes, and varieties of data collected to train them. The GDC acknowledges issues in AI governance but has little to offer in terms of concrete

solutions or even strategies.

Similarly, the GDC does bat for "data flow with trust" but many countries have refused to accept this idea because it goes against the spirit of digital sovereignty. Some even have specific laws that require data about their citizens to remain within their borders.

Finally, the GDC links various objectives and proposed actions with the relevant SDGs. This is a welcome move because it reflects the view that digitisation should play a prominent role in realising the SDGs. At the same time, when the SDGs were adopted in 2015, the current AI revolution hadn't started. Given the unimpressive record of nations in realising the SDGs, it is doubtful whether an add-on Compact like the GDC could make a difference.

The UN's member states are striving to find ways to work with and regulate Big Tech while also asserting their digital sovereignty. The global governance of digital technologies thus is too complex to be captured or 'fixed' by a singular entity like the GDC. We need multilateral as well as regional negotiations to go with it to address jurisdictional, regional, and/or local needs. By appealing to existing modes of digital governance as well as by combining SDGs with digitalisation, the GDC is positioning itself as an instrument of brainstorming rather than as a provider of roadmaps. Still, the GDC can help with capacity building and with South-South and North-South collaborations in the development of digital public goods.

In sum, the GDC may not result in a paradigm shift in the world's governance of digital technologies but it can facilitate significant and tangible outcomes if member states take it seriously.

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## Global Digital Compact: advancing digital innovation in a sustainable fashion (9 October)

The GDC is a diplomatic instrument which focuses on the potential of digital technologies, with the specific intention to harness and regulate them for the

## **common good. The GDC rests on the idea that digital technologies are dramatically changing our world**

- The 'Global Digital Compact' (GDC) was adopted at the UN's 'Summit of the Future'.
- The GDC focuses on harnessing and regulating digital technologies for the common good.
- It is a diplomatic instrument, not a binding law, outlining shared goals for various stakeholders.
- Increased adherence may lead to the GDC becoming soft laws in individual countries.
- The UN previously facilitated the 'Global Compact' and the 'Global Compact for Safe, Orderly, and Regular Migration'.
- The GDC acknowledges the transformative impact of digital technologies, which offer benefits but also pose challenges.
- Its aim is to ensure human oversight of technologies to advance sustainable development.
- The GDC builds on international law, the Universal Declaration of Human Rights, and the UN 2030 Agenda.
- Member countries have committed to establishing two panels:
  - An 'Independent International Scientific Panel on AI'
  - A 'Global Dialogue on AI Governance'.
- Goals include closing the digital divide, promoting inclusion in the digital economy, improving data access, and advancing responsible data governance.
- Principles of the Compact focus on inclusive participation, access to technology, sustainability, and trustworthy technologies within a competitive market.

## **Digital goods and services**

- The GDC proposes “digital public goods” to address the digital divide, including open-source software, open data, and open AI models.
- It emphasizes adherence to privacy and best practices, recognizing digital public goods as vital for social change and digital infrastructure.
- This infrastructure aims to develop shared digital systems based on the specific needs of stakeholders, envisioning partnerships with private entities.
- Lacunae in the GDC include:
  - Openness in public-private partnerships may be restricted by contractual requirements like non-disclosure and intellectual property protection.
  - The GDC calls for self-regulation by digital tech companies, which has proven ineffective in practice.
  - While it recognizes the importance of interoperable data governance, there are concerns about risks associated with increased data collection and processing without strong personal data protection laws.

- The GDC highlights the need for tracking progress towards Sustainable Development Goals (SDGs) but gives corporate entities more power in data governance, failing to address necessary countervailing measures against monopolistic control.

## **The GDC and the UN**

- The GDC makes wishful statements, assuming that cooperation among nations will suffice to achieve its objectives.
- This stance may reflect the UN's desire to remain a key player in governing technologies, including AI.
- Data is likened to oil in its value and its association with extractive industries that have polluting effects.
- The GDC acknowledges issues in AI governance but lacks concrete solutions or strategies.
- While advocating for “data flow with trust,” many countries reject this idea due to concerns over digital sovereignty, with specific laws requiring data about citizens to remain within national borders.
- The GDC links various objectives to the Sustainable Development Goals (SDGs), acknowledging the importance of digitization in achieving these goals.
- However, the current AI revolution was not anticipated when the SDGs were adopted in 2015, raising doubts about the GDC's effectiveness.
- Member states are trying to regulate Big Tech while asserting digital sovereignty, indicating the complexity of global digital governance cannot be addressed by the GDC alone.
- Multilateral and regional negotiations are needed to address jurisdictional and local needs.
- The GDC positions itself as a brainstorming instrument rather than a provider of detailed roadmaps.
- It can still contribute to capacity building and collaborations in developing digital public goods between nations.
- The GDC may not cause a paradigm shift in digital governance but can facilitate significant outcomes if member states engage with it seriously.