GS Paper II – International Relations

Afghanistan says 400 killed in Pak. airstrike on Kabul hospital

Bodies recovered from the drug rehabilitation centre as conflict between neighbours escalates; Islamabad rejects charge of targeting the hospital located beside former NATO base; it also dismisses claims of hundreds of casualties as 'propaganda'

Associated Press
KABUL

Rescuers recovered more bodies from the rubble of a drug rehabilitation hospital in Kabul on Tuesday after officials said an overnight airstrike killed more than 400 people, in a dramatic escalation of the conflict between Pakistan and Afghanistan that is now in its third week.

Pakistan rejected Afghanistan's accusation that it targeted the hospital, insisting its strikes, which were also conducted in eastern Afghanistan on Monday, were aimed at military facilities. It dismissed Afghanistan's claims of hundreds of casualties as propaganda. Crowds gathered to search for their loved ones among the injured and the dead. It was not possible to independently confirm the toll.

The conflict between Afghanistan and Pakistan has seen repeated cross-border clashes as well as airstrikes inside Afghanistan. International calls for ceasefire have gone unheeded.

'Safe haven to militants'

Pakistan accuses Afghanistan of providing safe haven for militants who carry out attacks inside Pakistan, especially for the Pakistani Taliban. The group is separate but closely allied with the Afghan Taliban who took over Afghanistan in 2021 in the wake of the chaotic withdrawal of U.S.-led troops. Kabul denies the charge.

In a late-night post on X, Afghanistan's deputy government spokesperson Hamdullah Fitrat said the airstrike hit the Omid Addiction Treatment Hospital, a 2,000-bed facility in Kabul, at about 9 p.m. local time and that large sections of the facility had been destroyed.

Razed to the ground: Residents and volunteers at the site on Tuesday after Pakistani airstrikes hit a drug rehabilitation centre in Kabul. AP

Interior Ministry spokesperson Abdul Mateen Qani said on Tuesday that 408 people had been killed and 265 injured.

Night-time local television footage showed security forces using flash lights as they carried casualties from the site while firefighters struggled to extinguish the flames.

The Omid hospital was renamed and expanded in size roughly a year ago from the Ibn Sina Drug Addiction Treatment Hospital as part of government plans to stamp out drug addiction in the country.

The site, near Kabul's international airport, is located beside a former NATO military base, Camp Phoenix, where U.S. forces used to train the Afghan National Army. After the Taliban seized power, the base was taken over by Afghanistan's new authorities. It was not immediately clear what was now housed on the site of the former base.

A reporter for the Associated Press in an area near the site at the time of the strike said he heard a military jet fly overhead, followed by a very powerful explosion.

Pakistan's Information Ministry said in an X post that the Pakistani military had "precisely targeted" Camp Phoenix, which it said was now a "military terrorist ammunition and equipment storage site." However, it said that the hospital was "multiple kilometres" away from the former camp and accused Afghan officials of lying. Google Maps shows another location, east of Kabul city, also labelled as Camp Phoenix.

"Another important question also lingers, as to why would an alleged drug rehabilitation facility be colocated with lethal ammunition storage site in a military camp? This also remains unanswered," the Information Ministry wrote.

'Perpetrating horrors'

Afghan government spokesperson Zabihullah Mujahid condemned the strike, accusing Pakistan of "targeting hospitals and civilian sites to perpetrate horrors". He said those killed were "innocent civilians and addicts."

"We strongly condemn this crime and consider such an act to be against all accepted principles and a crime against humanity," he said in a post on X.

Act 'barbaric', direct threat to regional peace: India

Kallol Bhattacherjee
NEW DELHI

India "unequivocally" condemned Pakistan's bombing of a hospital in Kabul, terming it "unconscionable" and "barbaric". "This heinous act of aggression by Pakistan is also a blatant assault on Afghanistan's sovereignty and a direct threat to regional peace and stability," External Affairs Ministry spokesperson Randhir Jaiswal said on Tuesday.

FULL REPORT ON
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GS Paper II – International Relations

India's West Asia reset, more sinned against than sinning

Mahesh Sachdev

is a former Indian Ambassador with an interest in West Asia and oil matters

During the past month, Indian policy towards West Asia has stirred domestic controversy. As substantive Indian interests are at stake, a professional assessment, based on two trends, is offered without wading into the domestic political blame game.

A link to two trends

First, over the past decade, India has raised its diplomatic engagement with West Asia. Prime Minister Narendra Modi has made 15 visits to the six countries of the Gulf Cooperation Council (GCC) – some after a multi-decade hiatus. He also visited Israel twice, and the Palestinian Authority and Iran each once. Comprehensive Economic Partnership Agreements (CEPA) have been signed with the United Arab Emirates (UAE) and Oman, and similar negotiations are underway with the GCC and Israel.

With over $160 billion in bilateral trade and 10 million diaspora, the GCC ranks as India's largest socio-economic partner. Last decade's engagements spurred synergy, although the promised investments have lagged. India's political gains include a de-hyphenation with Pakistan, greater strategic convergence with stronger defence and security tie-ups and growing acceptance of India as a responsible and friendly status quo power.

Second, the Gulf monarchies' ardour for a foreign power is normally rooted in the foreign power's potential contribution to the security and stability of their royal family, state and region – in that order. Exceptional turmoil in West Asia since October 2023, and a three-week-old war with the GCC countries under direct Iranian drone and missile attacks and the closure of the Strait of Hormuz, have accentuated their search for a better security paradigm than the eight-decade-old regional Pax Americana.

The recent reset in India's diplomacy in West Asia largely acknowledges the aforementioned two trends and attempts to harness them to serve India's national interest. To their credit, India's policymakers have finally realised which side of the bread is buttered, and have launched a qualitative upscaling of a symbiosis with key West Asian countries. Recent initiatives, such as Mr. Modi's visit to Israel and his individual phone calls to all his GCC counterparts during the early days of the hostilities, have not only assured them of India's categorical support to their security and stability but also conveyed that India shares and prioritises their concerns at this critical juncture. Later, he also spoke with his Iranian counterpart.

The new doctrine is clearer-sighted and emphasises hard diplomacy. This reset is bereft of two traditional aspects that often dampen the bilateral amity: First, India did not chant the traditional please-all mantras that left all stakeholders partially satisfied and India at the margins of the arena. There was no attempt to "balance" its public policy on controversial issues such as the "two-state solution" and Iran's quest for nuclear technology. Second, India's statements reflected its views without needless third-party citations. This demonstrates India's growing confidence as a credible and autonomous power.

Some domestic detractors have criticised the policy reset on multiple grounds. First, Mr. Modi's Israel visit (February 25-26) that concluded two days before Tel Aviv unleashed a military campaign against Iran is seen as untimely. Second, the perceived abandonment of India's traditional support for Palestinians and Iran is seen as immoral. Third, South Block is accused of surrendering India's sovereign autonomy to western dictates. Fourth, this activist reset may lead to strategic overreach with concomitant challenges such as exposure to security threats and costly defence tie-ups abroad.

The dates of the Prime Minister's visit to Israel were likely to have been set weeks in advance without any premonition of the February 28 offensive. The West Asian situation being perennially on the front burner makes any such visit risky, giving the ex-post facto criticism of the timing an unfair advantage of 50:50 hindsight. At the same time, the focus of the visit being bilateral renders it in a different domain.

Where other international actors stand

The perceived "immorality" of India's reset is largely misdirected and should be aimed at more worthy targets, such as China, Russia and Pakistan. Beijing siphoned off nearly 90% of the sanctioned Iranian oil exports, rendering only lip service to Tehran; Russia, which signed a 20-year Comprehensive Strategic Partnership Treaty with Iran last year, has also underdelivered. And last year, Pakistani generals promised to nuke Israel if it attacked Iran; they are now U.S. President Donald Trump's favourites. Similarly, even the Arabs and Muslim states were conspicuously silent during the Gaza conflict.

While the Indian reset is a long-overdue recognition of the tectonic geopolitical shifts in West Asia, the pendulum swung to the other extreme and is being gradually realigned with national interests. The regional dynamic being notoriously mercurial, India should strive to keep its options more open. The Palestine Cause cannot be wished away forever. At the end of the day, Iran would remain an important player for India as an oil supplier and as a large market for Indian products, reconstruction projects and services. Iran, which borders Pakistan and Afghanistan, could be a strategic ally. Further, if subterranean trends such as growing Arab unease with the American and Israeli Armageddon, the Saudi-UAE rift, the Iraq-Iran estrangement, and aggressive positioning by Pakistan and Türkiye are taken on board, a more nuanced reset would have suitably underscored continuity and inclusion. In retrospect, India could have reacted faster to the developments, such as the assassination of Iran's Supreme Leader and the appointment of his successor. Political correctness should not make India taciturn, as the diplomatic doublespeak offers many ways to skin the proverbial cat. India's relations with the U.S. and Israel are not so fragile as to be upended by our agreeing to disagree. Finally, India could have rendered more humanitarian relief to millions affected by the hostilities.

India needs balance, sensitivity and agility to leverage emerging opportunities in West Asia

An opportunity for India

The ongoing reset should accommodate two incipient, but profound, regional movements with long-term positives for India. First, the long-standing "Oil-for-Security" compact between the Washington-led West and the moderate Arab regimes has become a collateral casualty of the ongoing U.S.-Israel war against Iran. The U.S. joined Israel in attacking Iran without prior notification to the GCC, ignoring the latter's cautionary advice. The West not only failed to protect them from Iranian retaliation, but its military bases on their soil became lightning rods for the Iranian attacks. Now, they fear that the U.S. may abruptly conclude the campaign, leaving them to face Iran's wrath. Once the dust settles, the GCC states may reduce their reliance on the U.S. and diversify their security partnership options to countries such as India, which are less likely to act as a Praetorian Guard. India's response to any such proposal ought to be based on a careful SWOT analysis with clear rules of engagement.

Second, the Iranian retaliations against the GCC have disrupted business activity and supply chains, and an early return to 'business as usual' appears unlikely. The GCC's appeal as an oasis of eco-political stability in the turbulent region has taken a serious long-term knock, leading to some stakeholders' clamour for a "GCC+1" strategy. India's eco-diplomacy must strive to position India as a viable and attractive alternative hub to the GCC's ritzy but fragile hotspots, which thrived by weaning away capital and talent from India. The current commotion is a historic opportunity to seize what is rightfully ours.

To remain relevant and effective, a country needs a dynamic foreign policy grounded in realism and national interest. Its execution requires the right mix of consistency, agility and modulation. As India's West Asia policy matures, it is relevant to recall British Prime Minister Lord Palmerston's maxim, "We have no eternal allies, and we have no perpetual enemies. Our interests are eternal and perpetual...."

GS Paper II - Polity

Prison outbreak

India's overcrowded jails pose a serious health risk to inmates

The public health crisis in India's prisons is distinguished by its poorer infrastructure and a general disregard for treating ailments until they become inconvenient. A prisoner does not lose the right to health, a point courts have repeatedly stressed; yet, between August 20, 2025, and March 9, 2026, around 92 inmates at the Jalpaiguri Central Correctional Home were infected with herpes simplex virus (HSV) and seven of them died. HSV is common in the general population but experts have said that in immunocompromised or overcrowded populations with poor care, it can lead to encephalitis, which is often fatal. The Home's 171% occupancy rate rendered good hygiene and isolation a luxury. According to the 2023 Prison Statistics of India, district prisons in West Bengal have reported occupancy rates exceeding 160% and certain facilities, such as the Kandi Sub-Jail, have historically reached staggering levels of over 400%. While the State has many foreign national inmates, overcrowding is a persistent fact of India's correctional facilities. In 2023, 30% of inmates in 10 prisons in Kerala were found to have skin diseases caused by humidity and a lack of personal space. A 2023 study in *The Lancet Public Health* found prisoners in India five times more likely to develop tuberculosis (TB) than the general population. In 2025, the Home Ministry ordered prison screening camps as unventilated environments allow TB to spread rapidly. The Nagpur and Indore central jails had major COVID-19 outbreaks.

According to the India Justice Report 2025, HIV prevalence among inmates is also significantly higher than the national average due to shared equipment and inadequate screening at entry. Mandatory, comprehensive medical screening could catch many of these infections before they become injurious, which also requires facilities to have the requisite personnel. But the report also flagged a 43% vacancy rate for medical officers, resulting in the number of inmates per doctor being 2.6 times higher than recommended by the Model Prison Manual. There are also only 25 psychologists for India's 5.7 lakh inmates. Filling this gap requires integrating prisons into the National Health Mission, ensuring a sufficient number of health workers trained to manage outbreaks, and enforcing the Manual's standards uniformly across States. As West Bengal's actions in 2020 illustrate – temporarily releasing thousands of undertrials to relieve overcrowding in the South 24 Parganas District Correctional Home and the Baruipur Central Jail – the solutions are not confined to health. The judiciary must fast-track cases involving undertrials, who constitute the majority of inmates, expand the use of bail and non-custodial alternatives for minor offences and expedite the repatriation of foreign nationals.

GS Paper II - Polity

Why the affiliation system is outdated

Milind Kumar Sharma

teaches in the Department of Production and Industrial Engineering at MBM University, Jodhpur

An often less discussed feature of the National Education Policy (NEP), 2020 is the new regulatory system envisaged for affiliating colleges. The objective of the new system is to foster empowerment and autonomy by gradually phasing out the affiliation system over a period of 15 years through a process of graded autonomy.

The NEP suggests that each existing university should play the role of a mentor for its affiliated colleges, and enable them to develop their own capabilities and achieve minimum benchmarks in academic and curricular matters, teaching and assessment, governance reforms, financial robustness, and administrative efficiency in order to become self-reliant. All affiliated colleges will have to attain the minimum required standards to secure accreditation benchmarks and acquire the status of an autonomous degree-granting institution. Needless to say, it is a big reform for which nation-wide efforts and governmental support is a *sine qua non*.

Untethering colleges

The college-university affiliation system has long served as the foundational structure for higher education and is so deeply entrenched in the Indian higher education system that disassociating colleges with the university sounds unrealistic. Universities conduct affiliation for colleges in accordance with the University Grants Commission (UGC) guidelines to maintain academic standards, ensure uniform curriculum and examinations, and regulate infrastructure and faculty quality. Moreover, college affiliation in India is not a one-time process. The affiliation is usually granted initially for one year and renewed annually or periodically.

However, while the conventional university affiliation model once provided centralised control and administrative stability, it now seems to hinder the growth, autonomy, and quality of colleges. The university affiliation system is now riddled with systemic inefficiencies, archaic academic rigidity, and administrative challenges that impede the progress of colleges.

The university affiliation system is now riddled with systemic inefficiencies, archaic academic rigidity, and administrative challenges that impede the progress of colleges

Multiple challenges

One of the most significant problems with the affiliation system is the overwhelming burden it places on universities. Most universities in India are affiliated with hundreds of colleges, and entrusted to manage examinations, evaluate answer scripts, design curriculum, monitor college compliance, and oversee academic and extracurricular activities for an overwhelming number of students. The attention of resource strained universities, especially State universities, gets diverted from their core functions, such as research, innovation, faculty development, and collaboration, due to heavy administrative workloads. As a result, universities are compelled to act merely as bureaucratic bodies instead of pushing the boundaries of knowledge both for students and faculty.

The lack of autonomy for affiliated colleges poses another challenge. Under the present university affiliation system, it is mandatory for all colleges to follow the regulations, syllabi, examination patterns, and administrative instructions issued by the affiliating university. This dependency prevents colleges from designing their own courses that align with their local or industrial needs, and emerging market trends. This rigidity imposes uniformity at the cost of creativity, denying colleges the freedom to differentiate themselves through specialised courses, modern pedagogical practices, or interdisciplinary initiatives. As a result, the potential for innovation is stifled.

Then there is the slow pace at which curriculum reforms take place under the university affiliation model. Since universities oversee a large number of colleges, revising curricula requires extensive consultations, committee meetings with the board of studies and department councils, and administrative approvals from academic councils. This process often takes a very long time, causing course content to become outdated by the time reforms are implemented. The educational needs of students in disciplines such as engineering and technology change very rapidly, but the affiliation system is simply not agile enough to respond with the required speed.

Moreover, the affiliation model, despite its best intentions to standardise education, has led to quite the opposite. While all colleges may follow the same curriculum, the actual delivery of education varies drastically due to the huge gaps in infrastructure. Many colleges operate with inadequate laboratories, insufficient library facilities, outdated equipment, and a shortage of qualified teachers. Such disparities weaken the credibility of standardised learning outcomes, as students from different colleges under the same university may graduate with vastly different levels of skill and competence.

An alternate model

While the university affiliation system once played a vital role in expanding higher education, its limitations now hinder progressive educational aspirations.

Instead of affiliations, colleges may be encouraged to participate in the National Institutional Ranking Framework/National Board of Accreditation exercise which is grounded in established quality criteria. The future of higher education in India hinges on empowering institutions with autonomy, flexibility, and the capacity to innovate freely – conditions the affiliation system can no longer adequately provide.

GS Paper II – Social Justice

'UGC-like funding powers to fall under Shiksha Adhishthan'

Abhinay Lakshman
Sobhana K. Nair
NEW DELHI

The parliamentary panel examining the Bill is led by BJP MP D. Purandeswari.

Months after introducing the Viksit Bharat Shiksha Adhishthan Bill, 2025, with a primary objective to separate grants-disbursal powers from the higher education regulatory framework to minimise conflict of interest, the Education Ministry seems to have changed its mind. On Tuesday, it told the Joint Committee of Parliament examining the Bill that a UGC-like grants-disbursal mechanism will now be "devised and adopted under" the proposed Shiksha Adhishthan, without offering any specific details.

Ministry officials told the panel, led by BJP MP D. Purandeshwari, that the UGC currently disburses monthly grants to Central Universities from funds released to it by the Department of Higher Education. It also releases funds under its own schemes, based on quality standards, accreditation status, and National Institutional Ranking Framework (NIRF) ranking.

"Similar qualitative processes/systems shall be devised and adopted under Shiksha Adhishthan," the government told the panel.

Fourth sitting

The Joint Committee, which held its fourth sitting on Tuesday, has 12 members from the BJP and 10 members from Opposition parties, including the Congress, the Dravida Munnetra Kazhagam (DMK), the Trinamool Congress, the Samajwadi Party, and the Shiv Sena (UBT).

During this sitting, MPs from the Congress, DMK, and Trinamool Congress raised concerns about centralised control under the proposed structure, arguing that even though there is representation from States, it is the Centre that selects the State representatives. This would allow the Centre to set up a "super-regulator", they said, warning that this was against the principles of federalism.

'Skeletal' Bill

Opposition members also argued that the proposed legislation is "skeletal" in nature, requiring most of the details to be figured out by the government during the drafting of the Rules.

Some members argued this was akin to asking that the Bill be approved without presenting the whole scope of what the government plans to do.

GS Paper II - Polity

SC allows 12 weeks' paid leave to all new adoptive mothers

Krishnadas Rajagopal
NEW DELHI

The Supreme Court, in a judgment on Tuesday, declared the protection of maternity leave for working women as a basic human right while urging the Union government to legally recognise paternity leave as a social security benefit, noting that parenthood is not a solitary function performed by one parent alone.

The judgment came in a challenge to provisions in the Maternity Benefit Act, which was replaced by the Code of Social Security in November 2025, which dictated that only mothers who legally adopt a child below the age of three months were entitled to seek maternity benefit of 12 weeks.

'Lengthy process'

The petition filed by Hamsaanandini Nanduri, represented by advocate Bani Dikshit, argued that the provision under challenge, Section 60(4) of the 2020 Code, unjustly deprived a mother adopting a child of three months or above of

their physical and emotional well-being. Besides, the petitioner successfully argued that the process of legal adoption usually took over three months to complete, rendering the provision completely otiose.

Justice Pardiwala, authoring the judgment for a Bench comprising Justice R. Mahadevan, observed that an adoptive mother had the same rights and obligations towards the child as the natural mother. In fact, in a case of adoption, the emotional bond with the child has to be consciously nurtured through time, presence and sustained caregiving.

The court held adoption as an "expression of reproductive autonomy".

"The concept of maternity benefit acknowledges the ability of a woman to exercise her reproductive choices without fear of losing her employment, more particularly, the economic security. Thus, it ensures that motherhood does not become a factor for exclusion at the workplace," Justice Pardiwala observed in the judgment, concluding that the provision was unconstitutional and discriminatory.

The court pointed out that a mother, without maternity benefit, would be driven back to work, leaving the child with, probably an older sibling. "And if the older sibling happens to be a girl child, it would result in her being withdrawn from school, which reinforces the vicious cycle of gender inequality," Justice Pardiwala pointed out.

On father's presence

Pressing the Union government to make specific legal provisions for paternity leave, the Supreme Court said a child should not be deprived of her father's presence and a new mother her partner's companionship in the early phase of caregiving.

On scientific collaborations in BRICS

BRICS functions as a collaborative force aimed at establishing a multipolar world system. Cooperation in science, technology and innovation has been a key agenda for the grouping and has expanded over the years to include socially relevant areas such as energy, water, health and the environment

GS Paper III – Economic Development

Domestic LPG production up 38%, informs Centre

Domestic production now estimated at more than 48,000 tonnes on a day-to-day basis; increase follows issuance of supply maintenance orders

Kalyanaraman M.
CHENNAI

Domestic LPG production has increased 38% till date since the supply maintenance orders were issued, Union government officials said at a briefing on Tuesday.

In February, as per government data, domestic LPG production was slightly more than 1 million tonne. Normally, India's daily LPG consumption is around 90,000 tonne on an average. Out of this, 55,000 tonnes comes from imports and 35,000 from domestic production on a proportionate basis.

A 38% increase could mean that domestic production is now more than 48,000 tonnes on a day-to-day basis. Of the total LPG consumption, some 85-90% goes into households as cooking gas, while the remaining is for commercial and industrial purposes. Curbing industrial and commercial uses would mean that the daily import requirement has come down to around 30,000 tonne from 55,000 tonne.

The cargo of Shivalik and Nanda Devi, two LPG tankers that left the Strait of Hormuz with naval escort and have currently docked in India, will be adequate for three days of imports, as opposed to two days of imports in the past.

Kitchen lifeline: Of the total LPG consumption, some 85-90% goes into households as cooking gas. G.N. RAO

About half a dozen LPG tankers bound for India are still in the west of Strait of Hormuz. These carry a total of some 3 lakh tonne of LPG, according to the government. The Indian LPG system works on a continuous supply cycle since there is little long-term storage. The government is working to diversify sources of LPG, too, since most of the supplies were coming from the Persian Gulf in the past. "There is no real substitute for Gulf LPG in the Indian market. While alternative supplies are available, they come with longer shipping times and cannot provide immediate relief," said Manish Sejwal, Senior Vice President, Commodity Markets - Oil, Rystad Energy, an energy information agency based in Norway.

Qatar to west coast of India takes some four days on an LPG carrier. And a round voyage takes a little more than a week.

LPG ships are available for bringing in the fuel to India. "VLGC freight rates have not risen as sharply as those for crude or LNG carriers, partly because only about 4% of the global VLGC fleet was stranded west of Hormuz," said Mr. Sejwal. Meanwhile, two LPG vessels of each around 24,000 to 25,000 tonnes cargo are expected to arrive at Visakhapatnam between March 26 and 30. On March 7, a 24,000-tonne LPG vessel had docked Visakhapatnam. Ennore terminal, which sees two or three LPG ship calls a month is expecting an LPG ship on March 21.

(With inputs from Saptaparno Ghosh)

GS Paper III - Environment

A bit of a blur over India's new carbon credit plan

Arkalgud N. Ganeshamurthy

is Fellow of the National Academy of Agricultural Sciences (NAAS), the Indian Society of Soil Science (ISSS), former Emeritus Scientist, Indian Institute of Horticultural Research (IIHR), Bengaluru, and former Dean, Central Agricultural University, Imphal, Manipur

A significant policy announcement in the Union Budget 2026, involving a massive ₹20,000 crore outlay for a carbon credit programme, has sparked a wave of confusion and conflicting reports, pitting a clear-cut governmental road map for heavy industry against a burgeoning narrative of a new income stream for India's farmers. At the heart of the debate is a fundamental question. Is this Budget allocation designed to fund Carbon Capture, Utilization, and Storage (CCUS) technologies for smokestack industries? Or is it a pioneering scheme to help farmers earn carbon credits through sustainable agriculture? Evidence from official documents suggests the first, but a persistent parallel narrative, echoed in several media reports, insists on the second.

The first is the CCUS for "Hard-to-Abate" industries. The unambiguous anchor for the Budget announcement is the "R&D Roadmap for CCUS", released by the Department of Science and Technology (DST) in December 2025. This technical document, which forms the basis of the budgetary provision, leaves little room for ambiguity regarding its scope and intent. The road map explicitly identifies its target sectors, power, steel, cement, refineries, and chemicals. These are labelled as "hard-to-abate" industries where process emissions are concentrated, measurable, and technically challenging to eliminate through renewable energy alone. The proposed ₹20,000 crore over five years is earmarked for large-scale deployment of CCUS technologies, essentially capturing carbon dioxide from factory flue gases and either using it industrially or storing it underground.

Not on the list

Crucially, agriculture is conspicuously absent from this list of CCUS sectors. The road map acknowledges agriculture as a source of greenhouse gases (primarily methane and nitrous oxide) but only in an inventory context. It explicitly excludes agriculture from CCUS strategies because agricultural emissions are diffuse, biologically mediated, and not suited to the point-source capture technology that defines CCUS. The road map draws a clear line between CCUS (preventing new industrial emissions) and Carbon Dioxide Removal or CDR (drawing down existing atmospheric CO_2), where agriculture, through soil carbon sequestration, biochar, and agroforestry, plays a starring role.

The strategy requires distinct focus on both 'smokestack' and 'soil' initiatives

The second is the persistent counter-narrative of farmers as climate solutionists. Despite this clear industrial focus, articles and social media discourse have propagated a different story. This narrative posits that the budgetary outlay will directly enable farmers to participate in carbon markets by adopting regenerative practices, turning "farms into climate solutions".

The root of the confusion

This interpretation appears to conflate two distinct concepts. The Budget's CCUS fund (for industrial carbon capture) and the broader, evolving voluntary carbon market in India, where agriculture and forestry projects are already beginning to generate credits for global and domestic buyers. Proponents of the "farmer" narrative point to the growing global and domestic demand for nature-based carbon credits. Several private sector initiatives and State-level programmes are already piloting models where farmers are compensated for practices that enhance soil organic carbon. The confusion likely stems from the Budget's use of the term "carbon credit programme" in a broader sense, while its detailed architecture, as per the DST road map, is exclusively industrial.

Analysts say the confusion highlights a communication gap and a policy opportunity. The DST road map is is a technically sound, sector-specific document, but the Budget's use of the more familiar term 'carbon credit' has blurred lines. Mention of a "programme" amid discussion of agricultural carbon credits has led some to expect a funded scheme for farmers. This expectation is plausible, as the Agriculture Ministry has been exploring soil health and climate-resilient farming for years. A structured carbon farming programme is a logical next step, but it would need separate policy, funding, and institutional frameworks distinct from the costly, tech-heavy CCUS initiative.

The government faces the task of clarifying this distinction to manage expectations. The ₹20,000 crore CCUS programme is a critical pillar for decarbonising industry, a sector vital for growth but also responsible for a quarter of India's emissions. Its success is non-negotiable for meeting net-zero goals.

Simultaneously, the powerful narrative around farmers and carbon credits highlights a massive parallel opportunity. India's vast agricultural lands hold immense potential for carbon sequestration. A separate, well-designed policy to create a trusted domestic carbon market for agriculture could unlock enormous economic and environmental benefits, truly creating a "new income stream" for farmers.

A multi-sectoral approach is needed

The current debate underscores a pivotal moment in India's climate strategy. Budget 2026 has firmly placed its ₹20,000 crore bet on industrial decarbonisation through CCUS. The "farmer carbon credit" story, while not funded by this specific outlay, reflects a powerful and growing reality in the voluntary carbon space and a compelling demand for a parallel policy initiative. The path ahead requires the government to clearly demarcate these two crucial fronts in the climate fight – smokestack and soil – while advancing both with equal ambition. The confusion may be born of conflation today, but it points to the comprehensive, multi-sectoral approach India will need to forge a sustainable future.

GS III – Science & Technology

Cholesterol makes cells' nuclei squishy, helping melanoma spread

When cholesterol levels in the nuclear envelope were high, the nucleus became easier to deform; this is important because cancer cells often have to squeeze through tight gaps between other cells to spread and a squishier nucleus makes that squeezing easier, so the cancer can invade new tissues more successfully

D.P. Kasbekar

Melanoma is one of the most dangerous common skin cancers. It starts in melanocytes, the skin cells that make melanin, the pigment that gives skin its colour.

Cancer doesn't appear overnight. A normal cell becomes cancerous in steps, as its DNA and its gene-control systems pick up changes over time. These changes push the cell to do three things: divide too much, avoid being destroyed by the immune system, and spread into other parts of the body. This spread is called metastasis, and it is what makes many cancers deadly.

Researchers want to know which changes matter most because those changes can become targets for treatment.

Becoming squishy

A recent study led by scientists at the U.S. National Institutes of Health reported an unexpected driver of cancer spread: cholesterol in the membrane around the cell nucleus. The nucleus is the cell's control room, where most of the DNA is stored. It's wrapped in a thin nuclear envelope, like a flexible shell.

The team found this pattern in melanoma and also in breast and prostate cancers. When cholesterol levels in the nuclear envelope were high, the nucleus became easier to deform. In other words, it became more squishy. This is important because cancer cells often have to squeeze through tight gaps between other cells to spread. A squishier nucleus makes that squeezing easier, so the cancer can invade new tissues more successfully.

High cholesterol did something else, too: it made the nuclear envelope more fragile. Fragile envelopes were more likely to tear in small, local spots. When a tear happens, the DNA inside can be exposed to forces that damage it. Damaged DNA can lead to new mutations, and some of those new mutations can make the cancer even more aggressive.

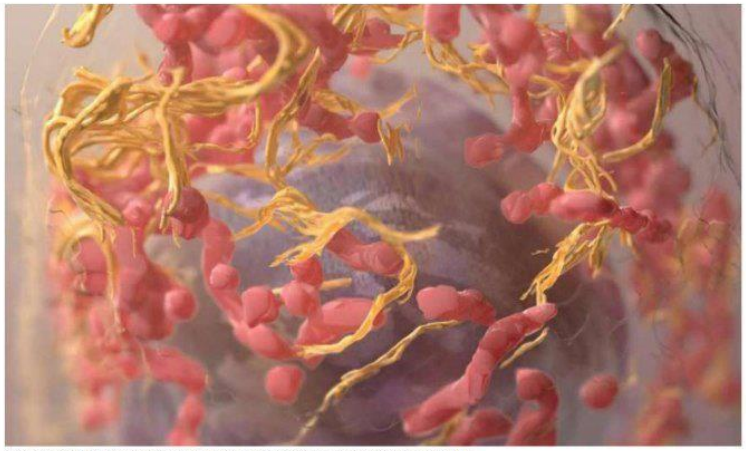
When the researchers lowered cholesterol levels in cancer cells, the cells became less invasive and less aggressive.

These findings also help explain an earlier observation: people with melanoma who were taking statins – drugs that lower cholesterol in the blood – seemed to show slower progression, on average, than people who were not.

Too much LBR

A big question arose: how did the cancer cells raise cholesterol in the nuclear envelope?

The study pointed to a protein called the lamin B receptor (LBR). Think of LBR as a tool with two parts sitting in the inner nuclear membrane. One part helps attach DNA (packed with proteins) to the inner surface of the nucleus. The other part helps the cell make cholesterol.



3D structure of a melanoma cell derived by ion abrasion scanning electron microscopy. NCI/UNSPLASH

In many melanoma samples, the researchers found that cells produced too much LBR. When LBR levels were high, the cellular cholesterol levels rose as well, and the nucleus became both more deformable and more fragile. When the team reduced the LBR levels, the nuclear envelope became tougher and less easily deformed.

Curiously, if the researchers used a version of LBR that couldn't do its cholesterol-making job, then boosting the LBR didn't produce the same fragile, squishy nucleus. This suggested the cholesterol-making function was central to the effect.

The team also tested what happened when they removed cholesterol directly from cell membranes: the nuclear membranes became much less fragile than in untreated cells. This fit the idea that cholesterol was changing the physical properties of the nuclear envelope.

A treatment target

The researchers then asked a bigger question: could this process start early in cancer development? If high LBR and high cholesterol appear early, then repeated small tears in the nuclear envelope could increase DNA damage over time. More DNA damage could then raise the chances of new mutations, leading to the cancer becoming more malignant.

The team engineered melanoma cells in two versions: one set with normal LBR levels and the other where LBR had been silenced (i.e. which lacked LBR). They injected these cells into mice. Tumours from the control cells showed more ruptured nuclear envelopes than tumours made from LBR-silenced cells. This supported the idea that LBR could help melanoma invade and spread in a living organism.

These findings also help explain an earlier observation: people with melanoma who were taking statins – drugs that lower cholesterol in the blood – seemed to show slower progression, on average, than people who were not

Finally, the researchers checked patient data in the real world. In one large melanoma dataset, called TCGA-SKCM, patients whose tumours showed higher LBR expression early tended to have worse outcomes. Put together, the evidence suggested that LBR could be a useful therapeutic target for slowing cancer metastasis. "The finding that LBR-mediated cholesterol production causes nuclear envelope fragility is intriguing in the context of cancer, as high cholesterol has been associated with tumour development and immune cell invasion in melanoma," the researchers wrote in their paper.

"Furthermore, epidemiological studies have shown that long-term statin use to decrease serum cholesterol is associated with decreased cancer progression and severity in many cancer subtypes, including melanoma."

"Increased cholesterol synthesis driven by upregulated LBR could serve as a metabolic enhancer," the authors continued, "increasing tumour cells' ability to proliferate and cope with nutrient-deprived conditions. Together, our findings suggest that LBR could be a prognostic indicator in early melanoma disease progression, and could serve as a drug target to prevent metastatic dissemination of melanoma, thereby improving prognosis for patient survival."

Curiosity-driven

Scientists first discovered LBR's cholesterol-related role more than 25 years ago in research that had nothing to do with cancer. In the 1970s and 1980s, researchers studying fungi identified genes involved in making sterols – which are cholesterol-like molecules in fungi. In the 1990s, when scientists compared DNA sequences, they noticed that a human gene, LBR, resembled a sterol-making gene in fungi.

That raised a curious question: could the human gene replace the broken fungal gene? It could. That experiment was early evidence that LBR is an enzyme that processes sterol.

Years later, that basic biology link helped researchers connect LBR to nuclear cholesterol and the spread of cancer. It's a clean example of how "why does this work this way?" research can eventually matter to medicine, even when no one can predict the connection in advance.

(D.P. Kasbekar is a retired scientist. kasbekardp@yahoo.co.in)

THE GIST

- A recent study led by scientists at the U.S. National Institutes of Health reported an unexpected driver of cancer spread: cholesterol in the membrane around the cell nucleus
- The team found this pattern in melanoma and also in breast and prostate cancers. When the researchers lowered cholesterol levels in cancer cells, the cells became less invasive and less aggressive
- The study pointed to a protein called the lamin B receptor (LBR). In many melanoma samples, the researchers found that cells produced too much LBR

GS Paper III – Environment

The cost of energy transition

Protests against the hydroelectric project in the Western Ghats just got new life

STATE OF PLAY

Sathish G.T.
sathish.gt@thehindu.co.in

The Karnataka High Court, earlier this month, directed the State government to stop work in the forest area for the Sharavathi Pumped Storage Hydroelectric Project, until further orders. A group of environmentalists had moved the Court, challenging the State Wildlife Board's approval for the proposed project in the Sharavathi Lion-Tailed Macaque Wildlife Sanctuary which is part of the Western Ghats, and a biodiversity hotspot. The Court's order boosted the morale of the environmentalists, who have been opposing the project since it was proposed in 2017.

The Karnataka Power Corporation Limited (KPCL) proposed the project in the valley of the Sharavathi river, which flows for about 130 km through the Western Ghats before reaching the Arabian sea. The river is already the State's primary hydel power source, with four major power stations operating in its valley.

The KPCL aims to generate 2,000 MW through this project to meet peak-hour energy demands, which can touch 18,000 MW daily. The project has been defended on the grounds that the Central Electricity Authority has recommended a transition to clean energy, targeting 50% non-fossil fuel capacity by 2030. Th the cost of the project which was estimated to be around ₹4,800 crore in 2017, has gone up to nearly ₹10,240 crore.

Furthermore, while the project has received the approval of the State Wildlife Board and an in-principle approval from the National

Board of Wildlife (NBWL), forest and environmental clearances are still pending.

Environmental concerns

The Karnataka State Wildlife Board gave its approval for the project in January 2025, with certain conditions. Initially, the KPCL had estimated that more than 16,000 trees were to be cut for the project. The board suggested that it be reduced to 7,000 to 8,000 trees.

Even so, the project continued to face stiff opposition from different groups. Environmentalists, locals, farmers' organisations, and heads of religious institutions spread over the Shivamogga and Uttara Kannada districts have been protesting against the project. They have held several meetings and highlighted the destruction the project will cause to the forests and the endangered species of flora and fauna, including the lion-tailed macaques, who are endemic to the place. Local residents, who have witnessed frequent landslips during heavy rains in the past few years, are worried that the construction of the tunnel might cause irreparable damage to the region. They are also concerned that the implementing agency might take additional forest land to lay the lines needed to carry the power generated by the project. Petitioners, including environmentalist Akhilesh Chipli, have alleged that the project is against the laws that prohibit non-forest activities in the region.

Interestingly, a site inspection report filed by Praneetha Paul, Deputy Inspector General of Forest of the Regional Office of the Ministry of Environment, Forest and Climate Change (MoEF), did not recommend the project proposal. The officer stated that the construction of new roads, and the widening of existing roads and other structures would result in the complete destruction of the wet evergreen forests, and that cutting trees would isolate the population of lion-tailed macaques. Environmentalists have cited this report as a key document to support their arguments.

Considering the serious opposition from the public, representatives of the KPCL held meetings in parts of Shivamogga and Uttara Kannada in October 2025 to defend the project. A team official tried to convince the people that the impact of the project would be minimal. They also argued that the project was necessary considering the need to reduce dependence on fossil fuels for energy production.

Enduring fight

However, the KPCL's efforts have failed to convince the protesters. Considering the stiff opposition, the MoEF sent an expert panel to visit the project site, and the panel, in its report, stated that the "limited operational benefit offered by the project seems outweighed by the irreversible ecological, environmental and social costs involved."

The legal setback and the adverse expert report have created a significant hurdle for the project's proponents. The KPCL's next move before the Court and the NBWL will be keenly watched.

GS Paper III – Science & Technology

T.N. needs more basic science funding to create green tech

Although revenue spending on science and technology has risen in recent years, State funding for fundamental research has been modest

DATA POINT

Vasudevan Mukunth

As Tamil Nadu approaches its Assembly elections, its ambition to become a $1-trillion economy by 2030 and its position as one of India's leading industrial and knowledge hubs means it's worth examining how the State has invested in science and environmental issues in the last five years.

First, the State's strategy for the environment has been to integrate climate action across sectors rather than increase a core allocation for the environment and climate change department. Within this framework, it has launched a series of dedicated environmental missions since 2021. In the 2021-22 fiscal, the State allocated ₹500 crore to establish the Tamil Nadu Climate Change Mission – one of the first of its kind among States – and another ₹150 crore for the Wetlands Mission to restore 100 ecologically sensitive water bodies. The following year, the State established the Tamil Nadu Green Climate Fund with a ₹1,000 crore corpus to finance renewable energy, electric mobility, pollution-control technologies, forest conservation, and circular-economy projects, among other climate-related technologies.

By 2023-24, it had expanded its conservation efforts by dedicating ₹10 crore to Project Nilgiri Tahr and scaling up the Green Tamil Nadu Mission to increase forest cover. The 2024-25 Budget expanded the Sustainably Harnessing Ocean Resources (SHORE) scheme to strengthen the blue economy, and provided subsidies for electric vehicles.

Spending surged in 2025-26 as the government allocated ₹21,178 crore to the energy department, which includes investments in renewable generation, pumped-storage hydro projects, battery energy storage systems, and other infrastructure, and ₹100 crore to build new basic science research centres in Chennai and Coimbatore.

Not enough funds

Second, although revenue spending on Science and Technology (S&T) has risen in recent years, it still represents only a small share of the State's broader fiscal priorities. It is important to note that according to the National S&T Management Information System (NSTMIS), Tamil Nadu had spent more than ₹600 crore a year on overall R&D until 2020-21. The difference arises because the NSTMIS assesses R&D expenditure across departments rather than going by the expenses under the S&T head.

Even this figure has two important dimensions. For Tamil Nadu, this expense is spread across agriculture (crop research, pest control, etc.), veterinary services (livestock and aquaculture research), public health (clinical research at State medical colleges), and other applied sectors. Dimension 1: applied research doesn't produce the underlying Intellectual property (IP). Dimension 2: in the same period when Tamil Nadu spent just over ₹600 crore a year on R&D, Gujarat spent ₹922 crore and Uttar Pradesh, more than ₹1,000 crore.

Chart 1 shows the expenditure on research and development by select State governments.

A global comparison is possible as well. When South Korea's Gross Domestic Product (GDP) per capita was what Tamil Nadu's is today, it was already allocating 1.2% of its GDP to R&D.

However, Tamil Nadu's total R&D expenditure is under 0.5% of its Gross State Domestic Product (GSDP), meaning that the State is currently spending less than half of what is required (by the South Korean yardstick) to foster a world-class innovation ecosystem.

The State's dedicated budgetary allocation for Science and Technology in particular has been much lower. In the decade or so leading up to 2021-22, Tamil Nadu had an annual revenue expenditure averaging around ₹10 crore, primarily for running the Tamil Nadu State Council for Science and Technology (TNSCST), the Science City in Chennai, the Tamil Nadu Science and Technology Centre, and for student projects and popularising science. But as it pivoted to being a technology-driven economy and got going on its 'net zero' commitment, the figures began to climb. By the 2025-26 fiscal, the allocation reached ₹67.5 crore and in 2026-27, an estimated ₹81 crore.

Need to focus on basic science

While the increase between pre-2021 and 2021-27 is eightfold in nominal terms, it is dwarfed by the allocations for climate-related missions. The State set aside more than ₹21,000 crore for the energy sector in 2025-26 alone. In fact, until it announced the ₹100 crore package in the 2025-26 Budget for the new basic science research centres in Chennai and Coimbatore, State funding for fundamental research was modest – most of it in the form of small grant programmes (₹10,000 to ₹1,00,000) such as those administered by the TNSCST. Major research institutions in the State, such as the Indian Institute of Technology (Madras) and the Institute of Mathematical Sciences, are mostly funded by the Union government.

Chart 2 shows the budget allocated by the State to the Science and Technology Centre and the Council for Science and Technology.

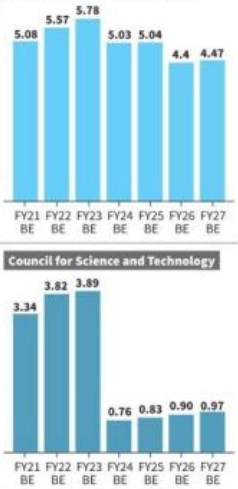
As a result, the State currently lacks the mature R&D required to develop homegrown technologies. Tamil Nadu's current expenditure risks rendering it a consumer of green technologies rather than a creator of underlying research breakthroughs. For instance, despite Tamil Nadu being a national leader in solar installations, more than 80% of photovoltaic modules in these projects are imported from China or sourced from manufacturing hubs in Gujarat.

Funding gap

The data for the charts were sourced from S&T Research Development Statistics 2022-23 and Tamil Nadu Budget

CHART 1: Expenditure on research and development by select State governments (in ₹ crore)

CHART 2: Budget allocated to the Science and Technology Centre and the Council for Science and Technology (in ₹ crore)



Tamil Nadu's current expenditure risks rendering it a consumer of green technologies rather than a creator of underlying research breakthroughs

With inputs from Nivedha M., who is interning with The Hindu Data Team