

EDITORIAL HIGHLIGHTS

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GS 3: Environment THE HINDU PAGE: 01

UN sets pathway to tackle 'inevitable breach' of the 1.5°C global warming limit

Jacob Koshy
NEW DELHI

Warning that a possible breach of the 1.5 degrees Celsius global warming limit will bring irreversible ecological losses that no adaptation initiatives could undo, the United Nations Environment Programme (UNEP) on Wednesday, for the first time, set out a detailed "overshoot, peak, and decline" pathway.

The pathway projects a trajectory where the world overshoots the 2015 Paris Agreement's central goal of limiting the rise in average global temperatures to 1.5 degrees Celsius above pre-industrial levels – which a UNEP report said was now unavoidable. The pathway seeks to hold peak temperatures after the overshoot as low as possible and then bring it back down below the limit by 2100.

The report, *Limiting Overshoot*, said global warming would cross 1.5 degrees Celsius "in the next few years". Even a scenario in which every country delivers on its national climate plan and net-zero target puts peak warming at 1.8 degrees Celsius, it said. According to the report, current policies point to a rise of about 2.6 degrees Celsius by 2100 with a range of 1.9-3.6 degrees Celsius.

"Overshoot, peak, and decline", the report said, "is by no means an acceptable or preferred pathway; it is simply the best remaining option". "This summer's scorching heat, raging wildfires, and deadly floods are a warning of

Climate concerns

The UN report proposes a pathway to hold peak global temperature as low as possible in the coming years and bring it back within the accepted limit by 2100

- The report says global warming will cross 1.5°C 'in the next few years' and that this is **no longer avoidable**
- A scenario in which every country delivers on its national climate plan and its net-zero target still puts peak global warming at 1.8°C
- Current policies point to about 2.6°C global warming by 2100, with a range of 1.9–3.6°C
- 'Overshoot, peak, and decline' is simply **'the best remaining option'**, the report says



what lies ahead. We must make the overshoot as small and short as possible," UN Secretary-General Antonio Guterres said in a statement.

The diplomatic grounds for that framing were laid at the 30th UN Climate Change Conference, COP30, held in 2025 in Brazil's Belém, where the consensus "Global Mutirão (collective effort)" decision became the first COP text to concede that a temporary overshoot of the 1.5 degrees Celsius limit was likely, given how fast the remaining carbon budget was being spent.

Compounding costs

Given that cuts alone will no longer suffice, a steep scaling up of nature-based removals such as large reforestation programmes was needed, COP30 CEO Ana Toni said.

The UNEP report suggested that time spent above 1.5 degrees Celsius carries compounding costs such as faster sea-level rise,

coral reef collapse, glacier loss exceeding a quarter of global mass by 2100, declines of up to 14% in global food production by 2050 without effective adaptation, and rising odds of irreversible tipping points in the West Antarctic and Greenland ice sheets, the Atlantic Meridional Overturning Circulation and the Amazon.

Moreover, it gets harder to roll back the effects of a tonne of emitted carbon. The report said every five years of continued high emissions adds roughly 0.1°C to peak warming. Reversing that same 0.1°C afterwards means pulling about 220 billion tonnes of carbon dioxide back out of the atmosphere over and above whatever is still being emitted.

The report, in a first for the UN, placed significant stress on methane, which contributes about 0.5°C of warming. Cutting it is described as the most effective way to slow warming in the near term.

GS 3: SCIENCE AND TECHNOLOGY THE HINDU

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Moving towards a universal vaccine against pneumonia and meningitis

Scientists are looking for a universal pneumococcal vaccine that can target all the hundred or so forms of *Streptococcus pneumoniae* bacteria, and prevent some undesirable outcomes created by existing vaccines that keep the threat of pneumococcal diseases alive in the human population

S. Swaminathan

There is a bacterium called *Streptococcus pneumoniae*. It comes in at least a hundred different forms, or serotypes, and lives in the tissue lining our nose and throat. *S. pneumoniae* is normally harmless. But when your body's immune system becomes weaker, for example when you have a viral fever, these bacteria may invade your lungs and cause pneumonia, your brain and spinal cord to cause meningitis, and your bloodstream to cause sepsis.

These diseases are called pneumococcal diseases, and fortunately, they can be prevented by vaccines. Each of these vaccines contains a unique sugary substance called a capsular polysaccharide, aimed at each serotype of *S. pneumoniae*. That is, they offer protection specific to each serotype.

And the current crop of pneumococcal vaccines protect against only a subset of the 100-odd serotypes. To increase coverage, scientists need to include additional serotype-specific capsular polysaccharides in the vaccine. And covering all the serotypes in a single shot would be extremely challenging, not to mention extremely expensive as well.

Sugary shot

Recently, a team of British scientists reported an important first step in this direction. They did two things: first, they switched the polysaccharide with proteins and, second, they adopted an approach called reverse vaccinology.

Basically, two kinds of pneumococcal vaccines are available today. One is a mix of purified capsular polysaccharides from multiple serotypes. Pneumovax 23 is an example. It does not work well in infants and offers short-lived protection.

To help boost the effects as well as the durability of the immune response, scientists have linked the polysaccharides to a carrier protein. Such vaccines are known as pneumococcal conjugate vaccines (PCVs). Typical examples include PCV10 and PCV14; the numerals denote the number of serotypes included.

When these vaccines target and eliminate some serotypes of *S. pneumoniae*, it also opens the door for other serotypes to mount an infection. These non-vaccine serotypes also face less biological competition for space and resources, so they multiply and eventually replace the vaccine targeted serotypes, rendering the vaccines obsolete.

Second, many non-vaccine serotypes either possess antibiotic resistance genes or can acquire them from their resistant counterparts. This leads to the rise of both vaccine- and antibiotic-resistant serotypes.

Thus, scientists are looking for a universal pneumococcal vaccine that can target all serotypes and prevent these outcomes, which keep the threat of pneumonia, meningitis, and other pneumococcal diseases alive in the population.



The agar plate with red blood cells on the left shows a positive *Staphylococcus* infection and on the right shows a positive *Streptococcus* infection. NC/UNSPASH

Reverse vaccinology starts from the germ's genome to identify proteins that can be included in vaccines. Scientists demonstrated an example of this in the recent COVID-19 pandemic; once the virus's genome was sequenced in early 2020, scientists around the world could analyse it and zero in on the spike-protein gene to make COVID-19 vaccines. The approach completely bypassed the need to culture the germs in large bioreactors and purify molecular components from them to make the vaccine.

The *S. pneumoniae* genome encodes more than 2,000 genes. Of them, around 1,300 are common across serotypes. The genomic data of more than 20,000 *S. pneumoniae* isolates across nearly a hundred serotypes are also available in the public domain.

The scientists deployed extensive computational analysis using an arsenal of bioinformatic tools to analyse these sequences.

They reasoned that the best candidate genes for creating their universal vaccine would need to encode for proteins with three attributes: (i) it must be located on the surface so that the immune system can easily access it; (ii) it must have low or no similarity to human proteins, so that the immune system does not attack the body's tissue; and (iii) it must be capable of eliciting a robust and durable anti-pneumococcal immunity.

The team shortlisted some candidates and further whittled the list down based on their predicted shapes and stability. From this, the team picked three

candidate genes. They were: zinc metalloprotease B (Z), pneumococcal adherence virulence factor A (P), and a protein which the scientists designated YfH0-like (Y) due to its similarity to another bacterial protein.

The team produced proteins Z, P, and Y in the laboratory and made an experimental vaccine by mixing them together. They also added two non-protein immune response boosters: a small piece of synthetic DNA called CpG and a sugary polymer called chitosan. They named this formulation ZPY-CpG-Ch.

Potent antibodies

To test whether the vaccine could elicit protective anti-pneumococcal antibodies, the scientists vaccinated laboratory mice. After some time, they exposed the mice to a lethal dose of *S. pneumoniae* serotype 1, which is known to be hypervirulent. Compared to unvaccinated mice, all of which succumbed to the lethal dose, vaccinated mice showed 80-100% survival.

Importantly, the scientists found that the level of protection offered by ZPY-CpG-Ch was comparable to that of PCV13.

The team also found that antibodies from the mice vaccinated with ZPY-CpG-Ch could help kill *S. pneumoniae* bacteria in a test tube. When injected into unvaccinated mice, the antibodies could also protect them against a lethal dose of serotype 1.

Third, ZPY-CpG-Ch fully protected

vaccinated mice exposed to lethal doses of two non-vaccine serotypes, 11A and 33F. It also offered 50% protection against a third non-vaccine serotype, called serotype 8.

In all mouse experiments, measures of the vaccine's protective effect based on the bacterial load in lungs and blood mirrored the rodents' survival rates. However, the ZPY-CpG-Ch vaccine did not reduce the load of pneumococcal bacteria in the upper respiratory passages of vaccinated mice. That is, despite being protected, vaccinated mice have the ability to still spread the infection to uninfected mice.

Worthy goal

Finally, the team also reported that vaccinating mice with ZPY-CpG-Ch stimulated a subset of immune cells that are implicated in pneumococcal immunity.

The results from this work are too preliminary for ZPY-CpG-Ch to be a universal pneumococcal vaccine. It has also been tested against a very small subset of serotypes, four to be precise. Vaccine data from laboratory mice also may not truly reflect the human situation.

Nevertheless, this work represents a baby step towards the worthy goal of developing a universal pneumococcal vaccine.

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GS 2: INTERNATIONAL RELATIONS THE HINDU

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'Early Harvest' — larger but not necessarily safer

On August 25, 2026, in Beijing, National Security Adviser Ajit Doval and China's Foreign Minister Wang Yi held the 25th round of talks between the Special Representatives (SRs) on the India-China boundary question. That evening's readouts from both sides were anodyne and notably avoided a phrase that has dominated this discussion for a year: early harvest. A day later, the two sides released an "Eight Points of Outcomes and Consensus". Point 3 restored and enhanced the phrase: the Expert Group on Boundary Delimitation and the Working Group on Border Management, set up under the Working Mechanism for Consultation and Coordination (WMCC) a year ago, would "respectively advance discussions on an Early and Substantial Harvest of boundary delimitation and Border Management". Their first task, it adds, is to agree on their own terms of reference, one year after they were constituted, suggesting that whatever is being contemplated remains at an early stage.

An uncertain Early Harvest

The phrase "Early and Substantial Harvest" is significant because it is India's own coinage. When Beijing first proposed settling the Sikkim Sector alone, India's considered response, around 2019, was a counter-proposal on an "Early and Substantial Harvest" covering the Sikkim Sector together with the entire Middle Sector, with the boundary delineated along the watershed. China rejected the proposal. In subsequent discussions on an "Early Harvest," China reportedly agreed only to include the Sikkim Sector and some undisputed areas of the Middle Sector — a proposal that was unacceptable to India.

The exact Indian formulation has now resurfaced in a joint document. This could mean that Beijing has accepted India's terms — which this writer doubts — as that would involve China giving up its claim to approximately 2,450 square kilometres of territory in the Middle Sector, all south of the watershed boundary (Barahoti, Giu-Kaurik, Nilang-Jadhang, Sangcha Malla, and Laphthal). It could equally mean something the Indian side had rejected earlier: an "agreement with holes", a settlement nominally covering both sectors but confined to stretches where the claims already coincide, leaving the trijunctions and contested pockets of the Middle Sector undefined.

If that is the case, we will have the same asymmetric outcome as with a Sikkim-only settlement — India conceding ground where its position is strong, without any progress in the Eastern and Western Sectors, where China maintains its hardline position, "dong tiao xi rang", meaning "meaningful adjustments by India in the East and corresponding concessions by China in the West". It would also jettison a key provision (Article III) of the 2005 Agreement on



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Political Parameters and Guiding Principles for the Settlement of the India-China Boundary, which calls for a "package settlement ...covering all sectors of the India-China boundary", opting instead to bank the easy gains immediately while leaving the hard issues open on China's terms. The package clause exists precisely because the boundary's four sectors are strategically interlinked, requiring cross-sector give and take.

No open-and-shut case

The Sikkim Sector is also not the open-and-shut case that some suggest. The two sides agree that the Anglo-Chinese Convention of 1890 is the "basis of the alignment" of the boundary in this sector. However, Article I of the Convention contains two stipulations that are mutually contradictory. Its first sentence makes the watershed crest the boundary, while its second names Mount Gipmochi as the starting point on the Bhutan frontier. Yet, British Indian maps of 1907 and 1913 placed the trijunction not at Gipmochi but roughly 6.5 kilometres to its north, on the true watershed crest. India and Bhutan read the watershed principle as controlling and place the trijunction at Batang La; China seizes on the literal reference to Gipmochi to push the trijunction southwards, onto the Jampheri Ridge. A Sikkim delimitation built on the 1890 text, unless it repudiates Gipmochi, would be read by Beijing as conceding the southern trijunction.

Even a trijunction-reserved settlement would strip India of the standing to counsel Bhutan against a bilateral deal, having itself settled out of turn nearby. China's "package proposal" to Bhutan — relinquishing roughly 495 sq km of claims in the north in exchange for Bhutan ceding about 269 sq km in the northwest, including the Doklam Plateau — would gain fresh momentum, deepening China's presence in the Chumbi Valley and opening a path to the Jampheri Ridge, from which the entire Siliguri Corridor, India's sole overland link to its northeastern States, would come under direct observation. This is not hypothetical: since the 2017 Doklam standoff, China has spent years building roads, villages, and military facilities across western Bhutan, gaining de facto control over Doklam.

A genuine "Early and Substantial Harvest" requires three things. First, delineation must proceed on the highest-watershed principle across the entire stretch in both sectors, rather than selectively along segments where the two positions already converge, which would serve no purpose for India. Second, trijunction points, at Batang La and any comparable third-country-adjacent points in the Middle Sector, must be explicitly excluded from the Expert Group's mandate and settled only in consultation with the country concerned, as stipulated in the 2012 Common Understanding between the two SRs. However, unless the highest-watershed principle is accepted, silence

on the trijunction will, on the ground, be filled in Beijing's favour in Bhutan. Third, the terms of reference for the Expert Group must extend India's 2019 proposal in good faith, rather than dilute it beyond recognition.

Several questions about these negotiations remain unanswered. The Chinese readout of August 25 reiterates a commitment to a "package" settlement, but how will that commitment be reconciled with a piecemeal approach to settlement? How is the setting up of an Expert Group on Delimitation consistent with the instructions given to the SRs in Article X of the 2005 Agreement, which require them to "continue consultations in an earnest manner with the objective of arriving at an agreed framework for a boundary settlement, which will provide the basis for the delineation and demarcation of the India-China boundary to be subsequently undertaken by civil and military officials and surveyors of the two sides"? There is no agreed framework yet, but it is proposed to commence the process of "delimitation", a term that the Chinese use interchangeably with "demarcation". Indeed, the 2005 Agreement does not use the term "delimitation" at all. Will the SRs earnestly pursue negotiations on the "agreed framework", or will they, in effect, leave it in abeyance while officials grapple with a partial delimitation exercise without such a framework? The other elements of the Eight Points — additional meeting points and hotlines for the General Level Mechanisms in the Eastern and Middle Sectors, continued pilgrimage and border trade, and a September meeting on trans-border rivers — are useful, incremental confidence-building measures. But they belong to a different track from boundary settlement and should not be conflated in public discussion.

The Eight Points are silent on the Medog County project on the Yarlung Tsangpo River, while referring to both sides agreeing to "maintain communication on (trans-border river) issues, including hydrological data sharing and renewal of the relevant MoUs", without reporting any progress. The September meeting should convey India's concerns about the project — the world's largest hydropower plant — being built close to the border in the Eastern Sector, in a highly earthquake-prone zone, a risk underscored by the flash floods in Nepal on August 26.

Avoid optics

Two points bear reiteration. First, the 2005 agreement — the only substantive outcome of 23 years of SR talks — must not be diluted; China has sought to reinterpret and undermine it since its conclusion. Second, Indian negotiators must guard against the temptation to project contrived progress. Diplomacy that trades long-term strategic interests for short-term optics is self-defeating.

India-China boundary talks suggest movement, but hard questions remain over strategic costs and concessions

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Reducing India's exposure to U.S. tariff risks

The U.S. Senate recently passed the Lindsey O. Graham Sanctioning Russia and Iran Act of 2026, imposing sanctions and authorising additional tariffs and other restrictions related to Russia. Most concerning is a provision authorising tariffs of up to 100% on countries among the five largest importers of Russian crude oil or natural gas if they knowingly make new purchases after enactment. Though it still awaits House approval, enactment could have serious implications for India's economic interests.

The Russian oil dilemma

India has diversified its energy supplies in recent years to reduce its crude import bill and gain strategic advantage amid global uncertainty, driving a sharp rise in Russian crude imports. Before the Russia-Ukraine conflict, Russian crude accounted for just 2% of India's imports; it is now roughly half.

In 2026 alone, imports nearly doubled from 4.54 MMT in January to 8.96 MMT in May. While



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The Lindsey O. Graham Act puts India under pressure, but export diversification and domestic reforms can cushion shocks

the strategy has helped secure supplies, it carries diplomatic costs, particularly in managing ties with the United States, which seeks to strongly discourage these imports. The U.S. Russia Sanctions Act reflects this pressure.

On July 24, before the bill's introduction, the U.S. imposed forced-labour tariffs on 60 countries, including India, under Section 301 of the Trade Act of 1974, imposing an additional 10% tariff, a replacement of the expired 10% duty under Section 122, on India. If the Russia Sanctions Act becomes law, India's cumulative tariff could reach 110%, making it one of the most heavily tariffed countries. Such high tariffs could affect India's price competitiveness in the U.S., a major export market, leading to economic losses. China's cumulative tariff could reach 112.5%, as both countries are major importers of Russian crude.

Trade simulations and results

To analyse the trade dynamics and possible way forward for India, two global trade simulations were conducted using the GTAP dataset and model, a global general equilibrium model that captures global linkages and country-level shocks. The first (sanction scenario) models a 110% U.S. tariff on India, with other countries facing forced-labour tariffs and China facing 112.5%. The second (diversification scenario) applies the same tariffs while India pursues export diversification, proxied by a full India-European Union free trade agreement (FTA).

The simulation results suggest that the proposed U.S. sanctions could have adverse consequences for the Indian economy. Under the sanction scenario, India's welfare declines by nearly \$47 billion, while GDP, output, domestic demand, exports, and imports all contract. Aggregate exports fall by 5.1% and imports by 5.2%, reflecting disrupted trade flows and weaker

economic activity. The results indicate that a prolonged tariff-based confrontation with the U.S. could impose substantial costs on India's growth and trade performance.

The picture changes considerably when India responds through export diversification. With a functional India-EU FTA, the economy turns around despite the same tariff environment. Welfare improves by \$26.3 billion, GDP turns positive, and sectoral output and domestic demand recover by around 1%. Aggregate exports increase by 3.1%, while imports rise by a moderate 2.6%, indicating stronger production and trade integration with alternative markets.

The findings suggest that even if India continues procuring crude from Russia to strengthen its energy security, the adverse economic effects of U.S. tariffs can be mitigated to a large extent through export diversification. The India-EU FTA, used here as a proxy for diversification, demonstrates that India must increasingly look beyond the U.S. and expand its presence in alternative markets, even as the U.S. remains one of its largest export destinations.

The strategy to pursue

However, diversification is not a panacea. It depends on the ability of other markets to absorb additional Indian exports. Without adequate external demand, diversification may remain limited.

Therefore, export diversification must be complemented by sustained domestic reforms, including trade facilitation, removal of non-tariff barriers, improved logistics and standards, and movement up the goods quality ladder. Such a strategy would not only enhance India's resilience to future geopolitical shocks but also strengthen its long-term export competitiveness.

The views expressed are personal

India's crude import from Russia



Source: Department of Commerce, Govt. of India

Impact of tariffs and export diversification

	Sanction scenario	Diversification scenario
Welfare (\$ billion)	-46.6	26.3
Change in GDP (%)	-0.02	0.01
Sectoral output (%)	-1.9	1.2
Domestic demand (%)	-1.8	1
Aggregate export (%)	-5.1	3.1
Aggregate import (%)	-5.2	2.6

Source: Writer's analysis using GTAP

GS 1: GEOGRAPHY THE HINDU PAGE: 09

River-linking is not the solution

The Union Minister for Home Affairs Amit Shah's speech at the Southern Zonal Council's meeting last month in Mamallapuram has provided a few takeaways on the contentious issue of water sharing. His emphasis on the need for an early resolution of water-related issues in the southern region appears well meaning but it is easier said than done. He had also talked about linking major rivers from the Brahmaputra to the Godavari and the Cauvery, an option that, according to Mr. Shah, can ensure that India faces no water shortage for 100 years.

However, water issues are not that easy to solve. This is evident from the Centre's response to Tamil Nadu's demand for the constitution of a tribunal to adjudicate the Pennaiyar river water dispute. Aggrieved over the "violation" of the 1892 inter-State agreement by Karnataka, Tamil Nadu, in November 2019, requested the Centre to establish a tribunal. It had also moved the Supreme Court with the same demand. Since then, two negotiation committees have been formed and 11 meetings held. Eventually, the top court, this February, directed the Centre to form the tribunal within a month and, later, extended the deadline by six months.

Still, the adjudicatory body is yet to be put in place. Meanwhile, the Centre asked the court whether the Pennaiyar dispute could be referred to the Mahadayi Water Dispute Tribunal instead of constituting a new tribunal. This suggestion defies logic as there is nothing in common between the two



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In the last 130-odd years, the country has seen only a handful of inter-basin transfer projects, most of which are in south India

disputes. Moreover, the Interstate River Water Disputes Act, 1956 does not permit it. This suggestion in the Pennaiyar case gives the impression that the Centre is not keen on expeditiously implementing a judicial verdict in an inter-State river dispute. To cite one more example, the Central government has not yet replied to Tamil Nadu's demand, in March this year, to constitute a tribunal on the Mekedatu dam project proposed by Karnataka.

A complex problem

Given this background, one need not delve much into the complications that would entail by the inter-linking of rivers. Proponents of river linking, including Tamil Nadu, have been saying that the idea is not to disturb the natural flow of any river but to divert a portion of the surplus water. Many experts are not convinced about this argument as they are worried that once the linking is allowed, regions that benefit may become vociferous in demanding water even in times of distress, eventually depriving original beneficiaries of their quota. This is apart from the concerns over the possible adverse consequences on ecology. In fact, Keralam has been stoutly opposing the Pamba-Achankovil-Vaippar link proposal, which, if implemented, the State says, will affect the Vembanad wetland system, where the Pamba and Achankovil rivers drain. However, the National Water Development Agency says that it has accounted for improving the flow of rivers in lean periods.

In the last 130-odd years, the country has seen only a handful of inter-basin transfer projects, most of which are in south India. The

Mullaperiyar dam, the Parambikulam-Aliyar project, the Krishna Water Supply Project, and the Indira Gandhi Canal Project are regarded as successful examples of inter-basin transfer of river waters.

After the Bharatiya Janata Party's return to power in 2014, the Union government formed a Special Committee for Interlinking of Rivers, which has held over two dozen meetings since then. Needless to say, there has not been much headway.

However, in 2024, Prime Minister Narendra Modi laid the foundation stone for the ₹44,000 crore Ken-Betwa Link Project. This has now led to agitations by the tribal populations in Chhatarpur.

What the governments, both at the Centre and in States, and civil society should focus on is demand side management, instead of perpetually looking for supply side interventions. With land becoming scarcely available and resistance growing among people when it comes to land acquisition, the days of implementing mega irrigation projects are almost over. The priority has to be towards conserving what is available and using it judiciously. A massive programme of sensitising and incentivising farmers on the optimal use of water has to be launched. Indiscriminate extraction of groundwater, facilitated by schemes of free electricity for agriculture in many States, is paving the way for ecological disaster and has to be curbed immediately. Unless water conservation becomes the mantra of all the stakeholders and is practised genuinely, disputes will be the norm.

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Decoding Russia's reliance on Indian petroleum products

Ukraine's recent relentless attacks on Russia's oil refineries has led the country to rely on India for petroleum imports

DATA POINT

Nitika Francis

Recent Ukrainian attacks on Russia's oil refineries has resulted in the latter importing refined petroleum products from India in significant quantities for the first time, at least since the Russia-Ukraine war started in February 2022.

As per multiple media reports, including one by the *Press Trust of India*, Indian refiners sent about one million barrels over the last two months, alongside Turkey and Morocco. Russia's import of petroleum products from India has remained negligible in the past, accounting for less than one per cent of India's petroleum exports. The bulk of exports went to countries like the Netherlands, Australia and the UAE (Chart 1).

Though the Indian government's export and import-related data for the last two months is yet to be released, reports have confirmed that the country's export of refined petroleum products to Russia has sharply increased in the last two months. This has tilted the huge imbalance that existed between the two countries in oil trade, albeit marginally. India continues to remain hugely dependent on Russia for crude.

One-fourth of India's petroleum imports since January 2022 were from Russia and this number remained high before U.S. President Donald Trump imposed additional tariffs on India in October 2025 for buying crude from Russia.

Though this resulted in India sharply cutting down its crude import from Russia, the imports resumed in full swing soon after. In fact, after the U.S. and Israel launched a war with Iran in February this year, the former did a U-turn in its stance and tacitly encouraged Russian crude supplies into the market to negate the impact of Iran's blockade in the Strait of Hormuz.

Chart 2 shows how Russia accounted for nearly one-third (31.6%) of India's crude imports as of June 2026. India imported \$531 million worth of crude from Russia in June 2026, which is roughly double that of its import from the country in January 2022, a month before Russia's invasion of Ukraine.

Amid Ukraine's continued targeting of Russia's oil refining infrastructure, the Russian Federation's Deputy Prime Minister Alexander Novak said in July that the country would begin importing oil products to help stabilise the domestic market.

Consistent attacks

According to the International Strategic Action Network for Security, there were at least 17 attacks on 16 different oil refineries in Russia. Eight attacks were targeted at oil depots and oil pumping stations in July (Chart 3). Though reliable data on similar attacks in August are not available yet, they seem to have continued at the same rate, resulting in petrol and diesel shortages.

Data from the Organization of the Petroleum Exporting Countries (OPEC) show that Russia's refinery crude throughput went from about 5.18 million barrels per day in Q12026 (January to March) to about 3.88 million barrels per day in Q32026. The attacks also seem to have contributed to a surge in crude exports from Russia, as unplanned refinery outages diverted higher volumes of crude to the export market. India, which ranks fourth in oil-refining capacity in the world, has utilised Russia's sudden demand to export refined petroleum products, mainly from private refineries (Chart 4). Considering the time it would take for Russia to bring its refining capacity back to its earlier capacity, the surge in exports could continue, which will help India in easing its pressure on foreign exchange in the coming months.

A refining relationship

The data were sourced from India's Ministry of Commerce and Industry, the International Strategic Action Network for Security, the Statistical Review of World Energy BP, and the Organization of the Petroleum Exporting Countries. With inputs from Gandia Sneha, who is interning with The Hindu's Data Team

CHART 1: Russia's share in India's petroleum exports has traditionally been less than 1% (not visible in the chart)

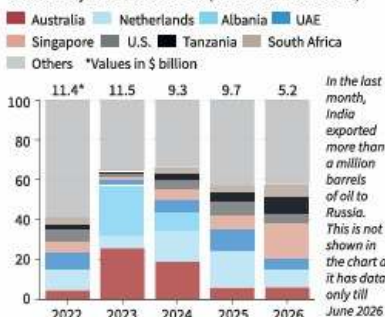


CHART 2: Russia accounted for more than one-fourth of India's total crude imports since January 2022

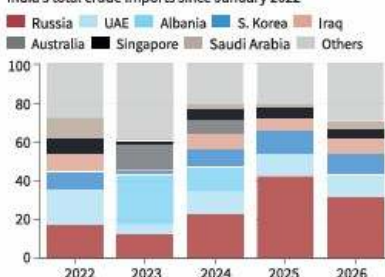


CHART 3: A total of 17 attacks were recorded against 16 different oil refineries in Russia in July

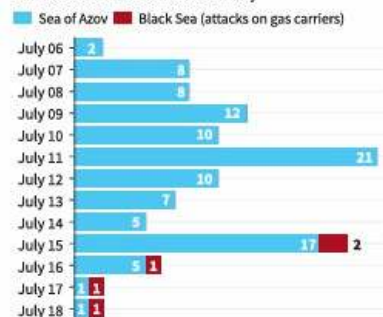
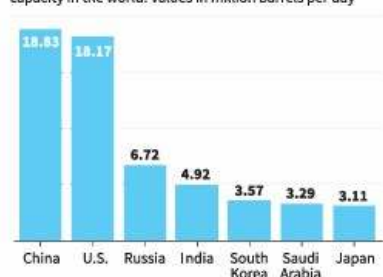


CHART 4: The seven countries with the highest oil refining capacity in the world. Values in million barrels per day



GS 2: POLITY THE HINDU PAGE: 10

Constitutional faultlines in FCRA Bill

The FCRA Amendment Bill, 2026 provides for a 'Designated Authority' to oversee the management and disposal of foreign contributions and assets when an organisation's FCRA certificate is cancelled or ceases to exist; raising questions about the extent of State intervention and the need for sufficient safeguards against overreach

LETTER & SPIRIT

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It is hard to deny that the state has a legitimate concern in regulating foreign contributions in India, as foreign donations raise issues concerning national security, transparency in democracy, and public accountability. For decades, the Foreign Contribution (Regulation) Act has been the instrument through which this interest has been pursued. However, the Foreign Contribution (Regulation) Amendment Bill, 2026 raises a different question altogether. It goes beyond regulating foreign contributions, to the extent to which the state may intervene in assets and institutional activities associated with them.

The fundamental issue, therefore, is not a debate between civil society and national security. It is about where the State, in pursuit of its legitimate regulatory goal, may cross the boundary from regulating foreign contributions to exercising undue executive control over the institutions that receive them.

The Bill's most important aspect is a statutory framework for the vesting, supervision, management and disposal of foreign contributions and assets through a 'Designated Authority'. Where an organisation's FCRA certificate is cancelled, surrendered or ceases to exist, including due to non-renewal, the Central government may appoint an authority to which the foreign contribution and assets created from it may vest provisionally. The measure is framed as an accountability mechanism to prevent the diversion or abuse of such properties.

Expansion of statutory consequences
However, the constitutional difficulty lies elsewhere.

The FCRA has always empowered the state to scrutinise foreign funding. If there are any violations in this regard, registrations can be withdrawn,



Opposition MPs protest in New Delhi on April 1, demanding the withdrawal of the FCRA Amendment Bill.

cancellation can follow continuing non-compliance, and penalties can attach to the diversion or misappropriation of foreign contributions. The Bill, however, represents a significant expansion of the statutory consequences that can follow the loss of FCRA registration. Importantly, the existing FCRA law already contains a provision for vesting assets created from foreign funds upon cancellation. What is new is the detailed statutory framework for their provisional vesting, possession, management, restoration and ultimately, permanent vesting and disposal.

In case of cancellation, surrender, or cessation of registration, the government may, through the Designated Authority, take possession of and manage assets created from foreign contributions and, where considered necessary or expedient in the public interest, undertake the management of the concerned organisation's activities. This is not merely a change in administrative policy; it raises a constitutional question about the extent to which a statute regulating foreign contributions may permit executive authorities to assume possession and, in specified circumstances, management of institutional assets and activities.

Even if the dichotomy between ownership and custody may have some legal relevance, its practical consequences are not. An entity whose success is dependent on the continuity of management will place greater emphasis on control than ownership. Ownership may remain formally undisturbed, but a change in management control fundamentally alters the relationship between the institution and the state. A hospital, school or laboratory is not made effective by ownership alone; it depends on its independence to administer, for charitable ends, what it owns.

Evaluation of proportionality

This is where the doctrine of constitutional proportionality may be relevant. The Supreme Court has repeatedly held that even where the state pursues a legitimate objective, the means it adopts must bear a reasonable connection to that objective and must maintain an appropriate balance between the public purpose and the burden imposed on rights. The amendment raises difficult questions when measured against the said rationale. If the consequence of losing FCRA registration is the provisional vesting of assets in, and potentially the

management of institutional activities by a government-appointed authority, the safeguards attending that transfer must be commensurately robust.

Therefore, the Bill warrants scrutiny of the extent of the discretion delegated to the executive, the safeguards governing its exercise and the standards applicable to decisions concerning possession, management, and permanent vesting. The Bill provides for the restoration of assets when registration is obtained, renewed, or restored within the prescribed period, as well as mechanisms for revision and judicial appeal. The constitutional question is whether these safeguards are sufficiently clear, timely and effective.

This concern becomes more significant against the broader regulatory landscape. Over the past decade, thousands of FCRA registrations have ceased to operate for reasons ranging from non-renewal to alleged statutory violations. While many regulatory actions may be justified, the Bill may increase the consequences arising from the cessation of registration. What might previously have been limited to the loss of eligibility to receive foreign funds could, under the proposed framework, extend to provisional management and, if registration is not restored within the prescribed period, permanent vesting and disposal of assets.

None of this suggests that the government lacks the authority to strengthen financial oversight or ensure that funds from abroad are used for lawful and proper ends. But in a constitutional order, any regime that reaches into the management of civil society's institutional infrastructure must operate within clear legislative standards.

Ultimately, the constitutional question posed by the FCRA Amendment Bill is not whether foreign contributions should be regulated, but how far the state may go in regulating institutions and their assets. (Thajaswini C.B. is an advocate practising before the Supreme Court, Madras and Delhi High Courts. Siddharth Dev Prasad is a 4th year law student at Gujarat National Law University.)

THE GIST

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GS 2: POLITY THE HINDU PAGE: 10

Can jurists be appointed as Supreme Court judges?

Why has the provision allowing distinguished jurists to be appointed as SC judges remained unused?

Aaratrika Bhaumik

The story so far:

Supreme Court judge Justice Ujjal Bhuyan on Sunday questioned why a constitutional provision allowing a "distinguished jurist" to be appointed as a judge of the Supreme Court has remained unused for more than 76 years. Addressing the 13th convocation of National Law University, Delhi's LL.M. programme, Justice Bhuyan pointed out that Article 124(3) of the Constitution permits the appointment of a person who, in the President's opinion, is a "distinguished jurist" as a Supreme Court judge. However, no legal academic has so far been elevated to the top court under this provision.

What does the Constitution stipulate?

Article 124(3) of the Constitution lays down three routes through which a

person may qualify for appointment as a Supreme Court Judge – a person must have served as a High Court judge for at least five years, practised as an advocate of a High Court for at least 10 years, or be, in the opinion of the President, a "distinguished jurist".

The provision, however, does not define who qualifies as a "distinguished jurist" or prescribe any minimum period of professional experience for such a person. Its inclusion as a separate category nevertheless indicates that the framers contemplated a route to the Supreme Court beyond the conventional pathways of judicial service and legal practice, potentially opening the door to eminent legal scholars and academics.

What do Constituent Assembly debates reflect?

The "distinguished jurist" category was added to the list of persons eligible for

appointment to the Supreme Court in the draft Constitution. The Constituent Assembly debates reflect that this was intended to bring diversity in professional backgrounds among those appointed to the Bench of the Supreme Court.

Moving the amendment on May 24, 1949, Constituent Assembly member H.V. Kamath said it sought "to open a wider field of choice" for Supreme Court appointments. He noted that persons with "outstanding legal and juristic learning" were "not necessarily confined to judges or advocates", pointing to the selection of judges of the International Court of Justice on similar terms.

The Constituent Assembly debates also referred to the appointment of Felix Frankfurter to the U.S. Supreme Court. In 1939, President Franklin D. Roosevelt appointed Frankfurter, who had been a professor at Harvard Law School for 25 years, as an Associate Justice of the U.S.

Supreme Court. Justice Frankfurter went on to become a noted advocate of the doctrine of judicial restraint – the principle that courts should respect the domain of the elected legislature and the executive, and exercise restraint in interfering with their decisions.

Assembly member M. Ananthasayanam Ayyangar cited Justice Frankfurter's appointment as a "novel experiment" that had worked well, noting that legal expertise was not confined to practising lawyers or judges.

Can a 'distinguished jurist' be appointed as a High Court judge?

The Constituent Assembly had also considered allowing "distinguished jurists" to be appointed as High Court judges. On June 7, 1949, Professor Shibban Lal Saksena moved an amendment proposing their inclusion among those eligible for appointment to a High Court. The proposal, however, was not accepted.

Nearly three decades later, the Constitution (Forty-second Amendment) Act, 1976, enacted during the Emergency, amended Article 217, which lays down the qualifications for appointment as a High Court judge. The amendment allowed a person who was, in the opinion of the President, a "distinguished jurist" to be appointed to a High Court. The provision came into force in January 1977 but was omitted by the Constitution (Forty-fourth

Amendment) Act, 1978.

What limits the use of this provision?

Despite being part of the Constitution since its inception, the provision has never been invoked. Supreme Court judges have overwhelmingly been appointed from among High Court judges, with only 11 advocates directly elevated from the Bar.

The appointment process itself may also help explain why the provision has remained unused, since a jurist would first have to be recommended by the Supreme Court Collegium. Legal scholar Upendra Baxi, whose possible appointment to the court never materialised, described the provision as a "dead issue" in a 2015 interview with LiveLaw.

Another concern is that legal academics may lack courtroom and procedural experience. However, full-time law teachers themselves face restrictions on practising as advocates. Under Rule 49 of the Bar Council of India Rules, an advocate who takes up full-time salaried employment must cease to practise while such employment continues. In 2019, the Consortium of National Law Universities sought a relaxation of this restriction to allow full-time faculty to practise in courts and bridge the divide between "law in books" and "law in action".

GS 3: SCIENCE AND TECHNOLOGY INDIAN EXPRESS PAGE: 15

Why India is enforcing a uniform time framework



ANAGHA JAYAKUMAR

THE UNION Consumer Affairs Ministry on August 27 notified new rules that make Indian Standard Time (IST) the legally enforceable reference for official and commercial use. The Legal Metrology (Indian Standard Time) Rules, 2026, require time-dependent systems in government and critical sectors to use a "traceable" and authorised IST reference within 180 days, rather than a random clock.

But India has already followed IST for decades. Why were the new rules needed and what changes will they bring?

People obtain time from many sources, often indirectly from GPS. A telecom provider provides the time maintained in its data centre, but there may be a lag of seconds or even minutes as people and organisations refer to different sources. "It is like each person establishing their own starting point; you then cannot properly compare events or measurements," said Poonam Arora, Head of the Time & Frequency Metrology Division at the Council of Scientific and Industrial Research-National Physical Laboratory (CSIR-NPL).

What do the new rules do?

India's Department of Legal Metrology enforces physical measurements in the country. Inspectors can check the gauges at a petrol pump or verify the weights used by an establishment. They did not have an equivalent capability for time — until now.

The new rules give time a legal status by calling for "traceability". In the context of these rules, traceability means showing that a clock or time source is ultimately linked to IST maintained by NPL — which will establish that it's accurate. Traceability can be established through different technologies, as we will explain further on, but with varying levels of precision.

The broader purpose of the new rules, is to make IST the country's common time reference for commercial and other purposes. "This can improve cybersecurity, reduce crime and make critical infrastructure more

• WHY ATOMIC CLOCKS ARE USED TO MEASURE TIME

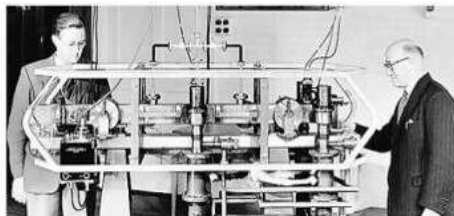
Every clock in the world needs an oscillator to keep time — be it a quartz crystal or a pendulum.

Quartz crystals vibrate at a precise frequency when voltage is applied to them. The vibrations of the crystal act like the pendulum of a grandfather clock, ticking off how much time has passed. But they can drift over time.

Even the best-performing quartz oscillators can be off by a nanosecond (one billionth of a second) after an hour. After six weeks, they may be off by a full millisecond (one thousandth of a second).

That would have a huge impact on, say, measuring the position of a fast-moving spacecraft.

This is where atomic clocks come in. As the name suggests, they effectively use atoms as oscillators.



The world's first caesium atomic clock, developed at UK National Physical Laboratory in 1955. WIKIMEDIA COMMONS

Though there are different types of atomic clocks, the following is the basic premise they operate on.

When electromagnetic radiation of a specific frequency is applied to an atom, it can cause the atom to switch between energy levels.

An electronic counter can keep track of these transitions, which happen at an extremely precise frequency.

Time can then be calculated by tracking this frequency. Countries across the world use advanced atomic clocks to measure time.

resilient," Arora told *The Indian Express*.

Who maintains time in the country?

The CSIR-NPL is mandated to maintain the country's scientific standards, such as mass and volume. Maintaining and "disseminating" IST is also part of its mandate.

A bank of extremely precise atomic clocks helps NPL maintain the country's time within a few nanoseconds of the international reference, Coordinated Universal Time. According to the NPL website, these clocks are so accurate that they would lose or gain one second in about three lakh years.

How is time 'disseminated'?

Dissemination of time essentially refers to the transmission of the standard time maintained by the NPL to external users and systems. There are different methods, with varying accuracy.

Your phone, for instance, shows you time indirectly derived from GPS.

The most common and accessible method — essentially how your computer shows you time — is a Network Time Protocol server. Network protocols synchronise the clocks of computers and devices over a network. The default server may be abroad,

Keeping track of time

A unified time source helps to coordinate systems across multiple sectors — from banks to telcos to defence.

Financial markets already operate under precise clock synchronisation requirements.

so it is not directly providing you the IST.

For more demanding applications, satellite links are used for highly precise time transfer. Given its importance, ISRO has to be traceable to the IST within nanoseconds.

Some Regional Reference Standards Laboratories (RRSL) now maintain secondary time scales traceable to IST, allowing the time standard to be disseminated from multiple locations, said Arora. In July 2026, the Union Consumer Affairs Ministry commissioned a White Rabbit Technology-based IST Dissemination Demonstration Network at the RRSL in Bengaluru. White Rabbit is an open-source networking technology designed to synchronise computer clocks over fibre-optic networks. Simply put, it sends a timing signal through a fibre-optic cable and measures how long the signal takes to reach another computer. Because that travel time can vary slightly, White Rabbit measures the delay and adjusts for it, allowing clocks in different locations to stay synchronised.

Who needs precise synchronisation?

Systems across multiple organisations — banks, telecommunications, power grids and even defence systems — need to coordinate. A unified time source helps es-

Organisations may get their time from different sources which may not be in sync. New rules will ensure a common IST reference across critical systems

tablish the sequence of events, coordinate activities across locations and reconstruct failures, transactions or cyber incidents.

"At the very least, an organisation should be able to show that its systems are synchronised with IST," Arora said.

The requirement is not only about display. There must also be synchronisation, so that the seconds start at the same time across applications and sectors. Financial markets already operate under precise clock-synchronisation requirements. Since 2013, SEBI has directed stock exchanges to synchronise their system clocks with atomic clocks before the start of the market so that their clocks have precision of at least one microsecond and accuracy of at least +/- one millisecond.

This precision matters because financial systems can generate and process orders in fractions of a second. Accurate timestamps help establish the sequence in which orders and trades happened and can be important when regulators investigate unusual activity or disputes.

What changes for you?

Very little changes for the ordinary user.

Arora noted that such changes would travel downstream as service providers comply with the rules, meaning the time supplied automatically to your device would be traceable to IST. "Unless you have a business, you are unlikely to face any immediate requirement. But accurate time can matter if investigators or a court need to reconstruct events, for example in a fraud investigation," Arora said.

Why is India now pushing for domestic timing infrastructure?

The push for IST uniformity comes along with India's efforts to reduce reliance on external satellite navigation systems and their timing signals. Arora noted that most people currently obtain time through GPS, which the US owns and controls. A decision by the US to degrade or deny access to its services, as it did to India during the Kargil War, could pose a problem. That episode pushed India to build the Indian Regional Navigation Satellite System or NavIC, providing regional satellite-navigation coverage over India. Alongside this, terrestrial systems such as White Rabbit can distribute IST over fibre-optic networks. Together, these give India more than one domestic route to provide precise time to critical infrastructure.

GS 3: INTERNATIONAL RELATIONS INDIAN EXPRESS PAGE: 13

Mountains bind India, China, and Nepal to a shared destiny. They need to honour it



THAROORTHINK
BY SHASHI THAROOR

THE RECENT catastrophe that struck Nepal offers a devastating reminder of the fragile, interconnected ecological reality of Himalayan Asia. A sudden collapse of ice and rock high in the mountains above the border region transformed within minutes into a violent surge of water, mud, and debris, sweeping through settlements, crushing critical infrastructure, and claiming over a thousand lives. The shockwaves of this tragedy were felt immediately in Kathmandu, where I happened to be visiting, along with various diplomats, politicians, and global observers gathered for pre-planned commitments.

During a high-profile conclave hosted in the capital by a leading Indian television news channel, the gravity of the situation completely reshaped the agenda. Addressing the audience, Rabi Lamichhane, the leader of the ruling Rashtriya Swatantra Party, made a poignant observation that cut through standard diplomatic platitudes. He noted, almost in passing, that whatever the prevailing geopolitical frictions, strategic rivalries, or sovereign boundary disputes among India, China, and Nepal, all three nations unavoidably share a single, unified mountain system. His remarks underscored a shared sentiment reverberating across Kathmandu: This tragedy was not merely an isolated localised accident, but a stark manifestation of accelerated global warming. It is a bitter irony that Nepal, whose greenhouse gas emissions are virtually negligible, bears the most brutal, immediate consequences of global climate change, while its vast, highly industrialised neighbours, especially to the north, account for a substantial portion of the atmospheric warming driving Himalayan glacial collapse.

Glaciers do not recognise international boundary lines, nor do glacial lakes, river basins, or atmospheric currents. When a glacial lake bursts, a landslide dams a transboundary river, or an ice-rock avalanche releases mil-



ILLUSTRATION: C.R. SASIKUMAR

lions of cubic metres of meltwater, creating a "barrier lake" that could burst at any time, the ensuing deluge flows downstream across sovereign frontiers. Yet, despite this undeniable physical unity, regional governance of the Himalayan biome remains deeply fragmented. The current crisis demonstrates the urgent necessity of establishing an institutionalised tripartite mechanism among India, Nepal, and China dedicated exclusively to ecological protection, real-time hydrological information-sharing, and joint climate adaptation efforts.

Designing such an institutional framework requires a clear-eyed assessment of the region's historical track record regarding ecological transparency. Cooperation between upper-riparian and lower-riparian states in the Himalayas has historically been uneven, reactive, and constrained by national security secrecy. Both India and Nepal have repeatedly expressed deep dissatisfaction with the quality, frequency, and timeliness of hydrological and geological data shared by China.

China controls the Tibetan Plateau, the crucial source of headwaters for Asia's major river systems, including the Yarlung Tsangpo (Brahmaputra), the Indus, and the upper tributaries of the Ganges, such as the Bhote Koshi and Karnali. Over the years, Beijing's approach to sharing hydrological data during the monsoon season has been governed largely by transactional, bilateral MoUs rather than automatic, open-data commitments. Lower-ripar-

ian nations have often been left in the dark during critical moments.

For instance, during previous incidents involving natural dams formed by massive landslides in Tibet, both Indian authorities in Arunachal Pradesh and Assam, as well as downstream Nepali communities, faced terrifying delays in receiving actionable flow rates or structural assessment data from Chinese monitoring stations. Similarly, when flash floods and artificial lake formations occurred along upper transboundary tributaries like the Pareechu River or the Bhote Koshi, downstream countries were often forced to rely on delayed commercial satellite imagery rather than immediate, official hydrological alerts from Beijing. Even existing bilateral mechanisms between India and Nepal, while more operational, have frequently suffered from administrative friction, inadequate instrumentation in remote high-altitude zones, and a lack of integrated early-warning architecture spanning the higher Himalayas down to the Gangetic plains.

If a tripartite environmental mechanism is to succeed where past arrangements have stumbled, it must transcend political posturing and operate on a purely technical, life-saving imperative. This requires three distinct pillars of engagement.

First, information-sharing must be transformed from a discretionary political courtesy into an automated, real-time protocol. High-altitude hydrometeorological stations, seismic sensors, and auto-

dated water-level gauges situated across Tibet, northern Nepal, and the Indian Himalayan region must feed into a shared regional data grid. Downstream communities in Nepal and India cannot afford to wait hours for administrative clearances in foreign capitals when a glacial outburst flood can travel downstream in a matter of minutes. Real-time satellite data, telemetry, and flood hazard modelling must be made accessible to emergency responders across all three nations simultaneously.

Second, joint ecological research and risk mapping must replace isolated national assessments. Thousands of potentially dangerous glacial lakes are scattered across the Hindu Kush-Himalayan range, many of them expanding rapidly as global temperatures rise. Mapping these hazards, assessing the structural stability of hanging glaciers, and predicting destabilising landslides requires joint scientific expeditions, cross-border remote sensing analysis, and shared ecological modelling. Establishing a joint scientific council under a tripartite banner would allow researchers to pool expertise.

Third, feasibility-based joint action must be pursued on the ground. Where high-risk glacial lakes threaten settlements across borders, joint engineering interventions (such as controlled siphoning, artificial drainage channels, or structural reinforcement) must be undertaken collaboratively. Coordinated disaster response drills and cross-border environmental conservation projects can build functional trust among military and civilian disaster response agencies that otherwise view each other through a lens of geopolitical suspicion.

The Himalaya is warming at a rate significantly higher than the global average, threatening the water security, safety, and livelihoods of over a billion people downstream. Nations can negotiate political boundaries, but they cannot negotiate with physics, geology, or changing atmospheric temperatures. As Lamichhane pointed out, the mountains bind India, China, and Nepal to a shared destiny. Establishing a dedicated, transparent tripartite mechanism for environmental cooperation is an absolute necessity for survival in an age of climate crisis.

The writer is a fourth-term Member of Parliament (Lok Sabha) for Thiruvananthapuram and chairman of the Parliamentary Standing Committee on External Affairs.

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