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# Shaping the port of the future

The Vizhinjam port is of immense significance to India's global maritime trade. Amongst all existing Indian ports, Vizhinjam is the closest to international shipping routes. Many global shipping stakeholders have already appreciated the role the port is going to play in transshipment

## FULL CONTEXT

Arun P.S.

**T**he town of Vizhinjam in Kerala has played a crucial role in the history of global maritime trade. Inscriptions from the Pandya-Chola era (1129 AD) records Vizhinjam as Rajendra Chola Pattinam, a port of Kerala. Historians claim that Balita, a port with considerable commercial importance which finds mention in the first century AD historical travelogue *The Periplus of the Erythraean Sea*, is Vizhinjam's old name. However, this historical significance faded away after colonisers of India prioritised ports in other places like Cochin and Madras.

In the 1940s, the princely state of Travancore commissioned a study to explore Vizhinjam's potential to set up a world-class port. And now, after almost eight decades of delays and uncertainties, India's first deep water and container transshipment port at Vizhinjam has been officially inaugurated by Prime Minister Narendra Modi.

The port, located in Thiruvananthapuram district, started limited-scale operations from July last year and began commercial operations in December. The first phase of this public private partnership (PPP) project cost ₹8,867 crore and was developed by the State Government of Kerala (₹5,595 crore), with the support of concessionaire Adani Ports (₹2,454 crore) and the Union Government (which provided a Viability Gap Funding (VGF) of ₹817.8 crore with repayment conditions).

### An important landmark

This port is of immense significance to India's global maritime trade. Currently, around 75% of India's transshipment cargo is handled at ports like Colombo, Singapore and Klang. The need to have a transshipment hub in India is being felt both economically and geopolitically. Amongst all existing Indian ports, Vizhinjam is the closest to international shipping routes, strategically located just 10 nautical miles from the global maritime trading route. Many global shipping stakeholders have already appreciated the role of Vizhinjam on the transshipment map, and as a result, the port has already handled 6 lakh TEUs (twenty-foot equivalent units) berthing more than 280 ships, much higher than the projection of one lakh TEUs for 12 months within launch of operations, including 1.08 lakh TEUs from 51 vessels in March this year. Many large ships prefer ports with 18-metre draft depth and Vizhinjam with a 20-metre natural draft can easily accommodate Ultra Large Container Vessels. The Mediterranean Shipping Company (MSC), one of the largest shipping companies globally, has included the port in two of their shipping services – the jade service (connecting Europe and Asia) and the dragon service (connecting Asia and the Mediterranean) after initial trial runs. This inclusion would direct more ships towards Vizhinjam.

The port has already made its presence felt through a number of milestones. This all-weather port is India's first greenfield port project. As India's first semi-automated port, it also flaunts a skilled women workforce operating automated cranes, another first in India. They were all trained at the Community Skill Park Vizhinjam, an industry-led PPP initiative launched by the Kerala government and operated by the Adani Skill Development Centre. In September



**Trade boost:** A view of the Vizhinjam International Seaport in Thiruvananthapuram on May 2. NIRMAL HARINDRAN

last year, MSC Claude Girardet (24,116 TEUs) docked in Vizhinjam Port making it the largest cargo ship ever to dock in South Asia. Earlier, large ships would use Colombo as a transshipment hub. In October, MSC Anna's docking witnessed the Vizhinjam Port handling 10,330 containers from a single ship, a record for any Indian port. MSC Irina, the world's largest container ship, is expected to dock in Vizhinjam in May this year.

### Need for a global push

While it is definitely a great start, there is a need to capitalise and surge ahead to reap maximum economic benefits. This triple engine (State, Union and concessionaire) project has the potential to make it big amongst the global players.

The Kerala government is aggressively pushing this prestige project to stakeholders across the globe. It has showcased the port at the World Economic Forum 2025, the Invest Kerala Global Summit 2025 and through a dedicated Vizhinjam Conclave 2025. The cover page of Kerala's State budget also featured an image of the Vizhinjam Port highlighting the significance of this project for the State's economic future. The State has signed an agreement with Adani Ports to fast-track the remaining phases, and it is set to be completed by 2028 instead of 2045. In March 2025, the Union Government granted the environmental clearance for the second and third phases. The ₹20,000 crore investment for the remaining phases will upgrade the port's handling capacity to 4.87 million TEUs from the existing one million TEUs and extend the length of the container berth from 1,200 metres to 2,000 metres.

### Challenges and opportunities

However, there persist some challenges which need to be addressed urgently. Firstly, a push to develop the associated infrastructure in a fast-paced model. For instance, the arrival of 40 ships in February, resulted in delays which should be avoided in the long run. Industry stakeholders like the Container Shipping Lines Association (CSLA) have flagged the absence of an Integrated Check Post (ICP). The application for the check post is currently pending with the Union Home Ministry; the check post is crucial for generating revenue beyond

transshipment through cargo operations and crew change facilities. A much-awaited Customs Office at the port was opened last month. The Kerala Steamer Agents Association had flagged the challenges owing to a delay in ICP approval in addition to the absence of a permanent Port Health Office, an important stakeholder for cargo operations.

The start of import-export operations at Vizhinjam could significantly help boost the local economy. The Kerala government had announced a Vizhinjam Development Zone with a focus on developing an industrial corridor covering the nearby regions. An IAS officer from the State could be allocated exclusively for overlooking the projects associated with the Vizhinjam Economic Growth corridor. In this year's budget, the Kerala government announced a dedicated space for other States to establish their official business centres near the port. The pace of completion of multiple projects including the National Highway 66 which connects to the port, the railway line connecting Balaramapuram to the port and the 63 km Thiruvananthapuram Outer Ring Road (ORR), would decide the fate of the future of the port.

There should also be efforts to promote allied businesses including ship building, ship repair, crew change facilities, logistics, warehousing and bunkering facilities. There is significant momentum for building a shipyard and ship repair centre in Poovar (10 kms from the Vizhinjam port). Adani Ports has announced that Vizhinjam Port will also be a global bunkering hub, supplying clean and green fuel like hydrogen and ammonia. The Kerala government's energy agency ANERT is exploring energy projects including wave power and green hydrogen projects near the port.

There is also a concerted campaign to change the name of the port to Trivandrum International Sea Port Limited, which offers a stronger value proposition from a global branding perspective and consistent with the 'IN TRV OI' location code allocated by the Directorate General of Systems and Data Management.

### Special economic zone

Mahindra Group Chairman Anand

Mahindra recently advocated for a Shenzhen equivalent city in India. Shenzhen used to be a quiet fishing village, like Vizhinjam, in the 1970s and became China's first Special Economic Zone in 1980. The Port of Shenzhen, established in 1980 has emerged as a top player in global maritime trade and contributed significantly in the transition of the city as the Silicon Valley of China. There is great potential for the deep sea port in Thiruvananthapuram to trigger a similar economic boom in the region, depending exclusively on how various actors including governments, the concessionaire, businesses, and local communities perceive these changes and rise to the occasion. The Kerala government should ideally fast-track the Vizhinjam Special Investment Region (SIR) Bill to create an economic zone, ensuring fair compensation and rehabilitation to the landowners and dwellers in cases of land pooling/acquisition.

Maybe when the Bill is introduced in the Kerala Legislative Assembly, it should be referred to a select committee to study various best practices across the globe in port-led economies including Shenzhen. On the other hand, the Union government should reconsider the decision to have another transshipment hub 40 km away from Vizhinjam in Colachel. Probably, in the interests of the economic viability of large-scale transshipment port projects, we need a policy similar to the greenfield airport policy that prevents new transshipment ports within 750-1,000 kms. Additionally, the Kerala government and legislators across the Left and Congress parties have expressed concerns regarding the repayment terms associated with the Union government's ₹817.8 crore VGF which could potentially escalate to approximately ₹10,000 crore over time, imposing a significant burden on the State's finances. In light of the project's critical economic and strategic value, the Union government could reconsider the repayment clause.

While we have a game-changing port ready, its global success will depend on strategic interventions by policymakers, swift adoption by businesses, and the pace of informed decision-making.

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## THE GIST

After almost eight decades of delays and uncertainties, India's first deep water and container transshipment port at Vizhinjam has been officially inaugurated by Prime Minister Narendra Modi.

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# Demise of foreign aid in India

Indian attitude to official and private foreign aid has always been ambivalent – sometimes welcoming, at other times hostile. With U.S. President Donald Trump's targeting of USAID, the death knell, at least for official aid, seems to have been rung. Other European countries may follow suit, thanks to continuing global conflicts, anti immigration sentiments, and the slowing of economic development in the aid-offering countries. The writing on the wall could not be clearer.

In fact, for India, the writing has been clear for several years now, much before Mr. Trump's action. Western aid-giving nations no longer see India as a country needing aid, given its high growth rate, its oft-vaunted claim of becoming the fifth largest economy by 2047, and the prevailing political and religious ideologies within the country.

India sought international aid soon after Independence to assist in its task of catching up with the developed world. Most of the aid went to the government, as it was believed that the government should be the lead change agent. The peak period was from 1955 to 1965, and most of it came from Western nations. Some official development aid also went to private organisations, especially from bilateral aid organisations, for both humanitarian and development needs.

However, official developmental aid has shown an almost constant decline, especially from 1970 onwards. After 1990, Official Development Assistance (ODA), as a proportion of either Gross National Product or public investment, became insignificant partly due to the success of India's growth story.

What India seeks now is Foreign Direct Investment (FDI) and global cooperation in trade, climate change, and technological developments. Thus, declining official aid is not as great a concern as declining private aid to non-government agencies, though



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While foreign aid may have had some drawbacks, it has played a valuable role for NGOs

it too will have downsides such as unemployment in aid-giving organisations in both donor and recipient countries, wastage of stockpiled food and medicines, and reduced global collaboration in health and environment.

Private non-governmental organisations engaged in development work – referred to as NGOs – will be more affected by a decline in aid, both official and private. NGOs not only take up the slack in government provision at the bottom but also hold up a mirror to the truth in governance.

While public donations sustained Indian NGOs in the pre-Independence period and for some years afterward, since the 1960s onwards, the two major sources for NGOs in development have come to be government grants and foreign aid. It is only since 2013, when corporate social responsibility contributions became mandatory, that corporate money has become somewhat significant.

External aid to NGOs, both from official and private sources, increased continuously, but slowly the amounts received from both have been coming down. Between 2017-18 and 2021-22, NGOs received ₹88,8820 million, but though correct estimates of Foreign Contributions Regulation Act (FCRA) aid are difficult to get, approximate figures indicate that the amount has gone down considerably.

## Probable reasons

The reason for the decline is less about the reluctance of foreign donors and more about the ambivalent attitude of the Indian government towards the receipt of foreign aid by Indian NGOs. While allowing NGOs to accept aid, government regulations have hedged it in with several restrictions since 1976, when the FCRA was passed. Even before the declaration of Emergency in 1975, the "foreign hand" had become a bogey phrase. The government began to blame it for anti-government sentiments and

activities. The anti-national activities purportedly holding up development included religious conversions to Christianity or Islam, protests against development projects, and various policies of the government.

The FCRA required those receiving or wishing to receive foreign money to register themselves with the Ministry of Home Affairs, and to use the funds strictly according to the rules. This Act and its rules have been amended in 2010, 2011, 2020, 2023, and again in 2024. Each time, the rules have been made more and more stringent, and several NGOs have lost their FCRA registrations.

Certain private foreign donors, such as the Soros Foundation and others, have also been actively discouraged. These factors pushing out aid will slowly but surely toll its death knell.

While foreign aid may have had some drawbacks, such as bringing in ideas not entirely or always suited to India, it has played a valuable role for NGOs. Where government grants are meagre, not easily available, and lacking the flexibility to meet changing conditions on the ground, foreign aid was more generous and allowed more flexibility in use, opened windows to the world outside in terms of new ideas and practices, and built the capacity of Indian NGOs. It also allowed NGOs to play a valuable watchdog role on abuses by the government or market forces by voicing dissent against policies and actions detrimental to poor and vulnerable constituencies.

If foreign aid ceases entirely, not only will there be unemployment in the voluntary sector, but also unfinished projects or shelving of new projects, and a slowing down of social sector development, but more importantly, no correction to government overreach.

While self-reliance is a laudable goal, deliberately killing the golden goose is, in effect, risking harm to India's national interests.

# India must rethink its Arctic outlook

As conflict zones multiply globally, another frontier is quietly slipping into turmoil – the Arctic. Long seen as a realm of scientific cooperation and environmental protection, the polar north is becoming a theatre of military and geopolitical competition. With Russia more assertive, China expanding its Arctic ambitions, and Washington renewing interest in Greenland, the region appears set for a renewed phase of strategic contestation.

In a curious way, the Arctic's movement from the margins of international politics to the heart of great power competition is an outcome of more than just clashing geopolitical ambitions. Climate change has been decisive, opening new maritime corridors and resource frontiers, and spurring a scramble for access. The Northern Sea Route (NSR), once passable only during narrow summer windows, is now virtually an open sea lane. Traffic is rising, potentially redrawing global trade patterns.

## A growing militarisation

Alongside this commercial promise lies a more concerning development: the steady militarisation of the high north. With Arctic states reopening old military bases, deploying submarines, and reinforcing claims through visible shows of force, the stakes for control and influence in the region are higher than ever.

To be sure, the militarising impulse of Arctic powers is not new. Nor is the tendency to leverage polar presence for wider strategic manoeuvring. United States President Donald Trump was the first to drop pretences when he proposed buying Greenland in 2019. Far from the absurdity many deemed it, the idea had clear geopolitical merit; behind Mr. Trump's theatrics lay a deeper instinct – a recognition that the Arctic was no longer peripheral to global power play, but central to it.

For non-Arctic powers such as India, the implications of a militarised Arctic are serious, prompting many to reassess their regional postures. Even so, New Delhi remains curiously



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An increasingly militarised Arctic demands new thinking from New Delhi

insulated from the region's shifting realities. Faced with complex challenges closer to home, India appears oddly impassive to the dangers taking shape in the high north.

India's 2022 Arctic Policy offers a thoughtful road map focused on climate science, environmental protection and sustainable development. It draws strength from the parallels between the Arctic and the Himalayan "Third Pole" – anchored in the belief that glacial melt and atmospheric shifts in the far north have cascading effects on South Asia's water security and monsoon cycles.

Yet, the policy underplays the Arctic's rapidly evolving strategic landscape. As regional actors pivot from cooperative science to geopolitical contestation, India's restrained posture risks relegating it to the margins. The predisposition to remain apolitical – justifiable in an earlier era – now appears increasingly anachronistic. Besides being absent from conversations reshaping access and governance, India remains detached from the emerging politics of influence in the Far North.

This is not to say that India lacks a presence in the Arctic. It operates a research station in Svalbard, contributes to polar expeditions, and holds observer status in the Arctic Council. But these mechanisms were designed for a more benign order – one built on consensus and mutual trust. With the existing order visibly fraying, scientific diplomacy no longer seems fit-for-purpose.

## A constructive role for India

The stakes for India are far from hypothetical. As the NSR becomes more viable, trade flows may shift northwards, potentially undercutting the relevance of the Indian Ocean sea lanes. Should Russia and China consolidate control over Arctic sea routes, India's aspirations to be a connectivity hub in the Indo-Pacific – articulated through initiatives such as Security and Growth for All in the Region (SAGAR) and the Indo-Pacific Oceans Initiative (IPOI) – could face serious headwinds.

More concerning for New Delhi is the blurring of boundaries between the Arctic and the Indo-Pacific. Growing Russia-China strategic coordination in the Arctic and China's expanding naval presence in the Indian Ocean are making it harder for India to focus solely on its maritime interests in the south. An added challenge is the growing unease among Nordic states over India's long-standing ties with Russia, particularly as Moscow's brazenness in the Ukraine war deepens.

India has yet to reassure its Arctic partners that an approach guided by strategic autonomy, rather than alignment, can still be beneficial for all sides.

## A more purposeful engagement

New Delhi, then, needs a recalibration – one that retains its climate-conscious ethos but builds sharper strategic focus. This calls for a three-part strategy. First, India must institutionalise Arctic engagement beyond science, with dedicated desks in the Foreign and Defence Ministries, regular inter-agency consultations, and collaboration with strategic think tanks. Second, New Delhi should partner with like-minded Arctic states on dual-use initiatives – polar logistics, maritime domain awareness, and satellite monitoring – that enhance India's credibility without raising red flags. Third, India must claim a seat at the table as new Arctic governance forums emerge – on infrastructure, shipping regulation, digital standards, and the blue economy. India must also approach the Arctic's political landscape with sensitivity, avoiding an extractive mindset and engaging local communities with restraint and respect.

India's current Arctic posture is not without merit, but it is no longer adequate. It rests on the hope that scientific cooperation and climate diplomacy can smooth over growing geopolitical fault lines. That hope is fast fading. The Arctic is now shaped less by principle than by power. Those unwilling to adapt could find themselves edged out of the emerging order.





# Not revenge or retaliation, but a paradigm shift

**T**he Pahalgam terror attack (April 22) has put Delhi and Islamabad into a different trajectory from the past, and is one that should alert the entire strategic community. This was the first such incident on this scale targeting civilians since the Mumbai 2008 attacks. The barbarity in Pahalgam, segregating men from women, identifying them by religion and then executing them is aimed not just at terrorising Indians, and crushing a slowly reviving Kashmiri economy but also of instigating a communal rift in the rest of the country. Unlike the "fidayeen" attacks of the past, where terrorists were sent in as cannon fodder, to continue to kill until eliminated by security forces, this attack seemed more precise, with an exfiltration plan in place. While a deeper inquiry into the lapses that allowed the attack to take place and for the terrorists to leave unchallenged is awaited, the government has announced diplomatic measures, which include the suspension of the Indus Waters Treaty (IWT). It has also given the defence forces the green light to plan a military operation.

## A response that is not just revenge

How does one craft a more long-term response, that does not just seek revenge or retaliation, but works as a deterrent in the short term and seeks to change patterns of cross-border behaviour in the long term?

To begin with, it is necessary to analyse India's varied responses to attacks of a similar magnitude over the past few years for what was, relatively speaking, more effective in securing India's security interests. While most analyses look at the responses to the Uri (2016) and Pulwama (2019) attacks, at least five different responses should be studied: this includes 2001, after the Parliament attack, when the Indian Army was mobilised during Operation Parakram. After the Mumbai attacks, the government launched an international campaign that pushed Pakistan to admit that terrorists had been raised and trained on its territory, and Pakistan was first put on the Financial Action Task Force (FATF) grey-list for terror financing and money laundering. In 2007 after the Samjhauta Express train attack and in January 2016 after the Pathankot attack, India asked Pakistan to join the investigation, and a Pakistani team was even invited to visit the Pathankot air force base in March 2016. After the Uri attack, the government okayed cross-Line of Control (LoC) surgical strikes to attack terror camps in Pakistan Occupied Kashmir (PoK). And in 2019, the Indian Air Force bombed a terror camp in Balakot, outside PoK, which then saw a counter-mobilisation by the Pakistan Air Force, the capture of an Indian pilot, and a helicopter accidentally shot down on the Indian side.

Given that the Pahalgam attack appears to have been a deliberately planned provocation, another similar response from India will be



Suhasini Haidar

expected, and would have been war-gamed already. This narrows strategic options for a strike that catches the other side unawares. Planners will not only need to eliminate the responses already tried in the past but they also must produce three separate strategies: a counter-terror strategy, a strategy for retaliation, and a strategy to manage Pakistan's counter-retaliation as well.

Three other areas of misadventure and miscalculation must also be factored in, beginning with Pakistan Army Chief General Asim Munir's apparent desire to escalate matters with India. A clear indicator of this were two recent speeches: calling for Pakistan to become a "hard state", underlining religious differences between Hindus and Muslims that fomented the "Two-nation theory", and the reference to Kashmir as a "jugular vein". It must be kept in mind that Gen. Munir was commissioned in the Pakistani Army in 1986 during Gen. Zia-ul-Haq's tenure as the President of Pakistan when the ideological purpose of the Pakistan Army was changed from "Ittehad, Yaqeen, Tanzeem (unity, faith and discipline)" to the more radicalised "Iman, Taqwa, Jihad fi Sabeelillah (faith, obedience of god and struggle for the path of Allah)", and this is likely to have left a lasting imprint. Gen. Munir has been under pressure not only to avenge the Jaffar Express attack in Pakistan in March this year in which, coincidentally or otherwise, 26 hostages, all men, were killed. Another pressure point is the continued popularity of Imran Khan, his biggest critic, who has been in jail for nearly two years. Even so, Gen. Munir, who will remain in the saddle until at least 2027 due to a change in Pakistani law last year, has few challenges to his will at present, and New Delhi must factor this in as well.

The role of China is another wild card, particularly if India's response to Pahalgam hurts well-entrenched China-Pakistan Economic Corridor interests in any way. The third room for error could come from any hastily prepared Indian response to the attacks, led by calls by some in New Delhi that it is time for a "definitive war", and that the time for "map-making" or "cartological changes" by capturing and holding parts of PoK is nigh.

## The diplomatic road ahead

At the same time, India's diplomacy has to double efforts to keep those counselling restraint, internationally, at bay, with the United States, the United Kingdom, the European Union, the United Arab Emirates and Saudi Arabia joining the chorus and attempting to mediate by calling on Delhi and Islamabad to "de-escalate". Such calls will only get louder if there is a retaliatory strike by India. In addition, India's decision to suspend the IWT could see a diplomatic pushback from the World Bank and others including upper

riparian states such as China, and lower riparian Bangladesh.

At the UN Security Council (UNSC), India had to suffer a "watered-down" statement issued last month, that omitted references to The Resistance Force (TRF), the group linked to the Lashkar-e-Taiba (LeT) that initially claimed responsibility for the Pahalgam attack, and to the "Government of India" as the relevant authority to cooperate with, as Pakistan is a current member of the UNSC. Despite that, India must bring a listing request for a UNSC designation of the TRF and its leadership – as it did for the LeT after the Mumbai attacks and the Jaish-e-Mohammed after Pulwama – and convince the U.S. and others to list the TRF as a Foreign Terrorist Organisation (FTO) in their countries. The FATF's strictures on Pakistan have been an effective tool in the past and must be revisited. A diplomatic campaign for the Comprehensive Convention on International Terrorism (CCIT) that India first proposed in the 1990s could also be re-energised, possibly using Opposition leaders and the Jammu-Kashmir leadership to head delegations abroad to defend India's responses, in the manner Prime Ministers Indira Gandhi (1971) and P.V. Narasimha Rao (1994) once did.

## LoC as the border

Finally, it is time to reconsider an idea that was prematurely discarded nearly two decades ago – of sealing the LoC into a more formal border. For too many years, Pakistan's military has used the LoC as a convenient conduit to bring over recruits for training and send over terrorists to carry out attacks in India – using both its permeability as well as its impermanence as a pretext to continue a proxy, asymmetric war. The TRF's initial telegram message, claiming responsibility for the Pahalgam massacre, was that the attack was aimed at stopping "demographic changes" in Jammu-Kashmir. On its side of the LoC in PoK however, Pakistan has completed demographic change, settling non-Kashmiris, army officers and others in the areas, and hiving off Gilgit-Baltistan into a federally administered area. These areas would be virtually ungovernable by India, even if they were to be taken over coercively.

It is, therefore, vital to call 'time of death' on Rawalpindi's 'jugular vein' theory and dreams of unifying the now-disparate regions of Jammu-Kashmir and somehow annexing the Kashmir Valley. New Delhi must revisit the LoC agreement proposals of 2007, that sought to turn the LoC or ceasefire line, into a de-facto border, with a view to making it a permanent International Border in the future. The role of the international community, if at all, would be in ensuring that Pakistan commits to it – if it wishes to ensure a lasting equilibrium in the region.

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Turning the Line of Control into the International Border is still a viable proposal to end the proxy war that Pakistan is waging on India





# From ploughs to panels, cultivating a solar-powered future for farmers

With benefits for food and energy production, agriphotovoltaics promise a dual harvest as well as prosperity for India's smallholder farmers; what would complete the picture is probably official incentivisation through inclusion of APVs in the government's flagship scheme on agricultural solarisation and also in the policy framework

Subhdeep Basu  
Laxmi Sharma

In 1981, German scientists Adolf Goetzberger and Armin Zastrow published a foundational paper arguing that dual land use for food and energy could bring significant benefits. They proposed elevating solar modules by about 2 m above the ground to allow crops to grow underneath, giving rise to the concept of agriphotovoltaics (APVs).

APVs integrate solar energy generation with agricultural production, offering a model that maximises land-use efficiency while augmenting farmers' income. With APVs, farmers will also be able to move energy back to the grid at a predetermined feed-in tariff, forging new streams of income alongside agricultural ones.

To accommodate APVs, the on-site solar infrastructure will have to be designed such that cultivation is possible between rows of solar panels, a.k.a. interspace orientation, and in the area available beneath the elevated panels, or overhead-tilted orientation.

There is a growing interest in APVs in India, but in practice it is mostly limited to demonstrative pilots by research institutes or private developer-owned and -managed APV systems.

A recent report by the Indian Council for Research on International Economic Relations (coauthored by the authors of this article) examined an APV system in Najafgarh, Delhi. A farmer had leased his land to solar energy company Sunmaster for 25 years to establish an APV facility.

Before the APV plant was operational, the farmer's net income was typically ₹41,000 per acre a year from traditional crops like wheat and mustard. After the APV was installed, the income included an annual rent of ₹1 lakh per acre. The returns from the crop cultivation and energy sales went to the developer. The farmer said this rent-based income was a stable alternative that kept him from worrying about uncertainties in agricultural yield.

The report also explored a hypothetical scenario in which a farmer, in addition to receiving lease income, had negotiated to receive the agricultural revenue as well. If the farmer cultivated high-value as well as shade-loving crops like potato, tomato, and turmeric, the income could have been up to ₹1.5 lakh per acre a year from crop cultivation in addition to ₹1 lakh per acre in rent – a sixfold increase in income over traditional open farming alone and a testament to APVs' potential to boost farmers' earnings.

Also, in addition to the apparent gains



An experimental agriphotovoltaic setup at the University of Arizona, KILLAMATOR (CC BY-SA)

in land-use efficiency, APVs may also create favourable microclimatic conditions that reduce water loss from and heat stress on plants.

## Need for standards

Unlike many other countries, India lacks standardised norms for APVs, creating ambiguity in project design. Countries leading in APV adoption, including Japan and Germany, could offer valuable lessons in this regard.

Japan requires all APV structures to be temporary and removable, a minimum panel height of 2 m, and a maximum crop yield loss of 20%. The Japanese government reviews projects for renewal every three years based on their effects on the agricultural output.

Likewise, Germany has introduced a standardised framework called DIN SPEC 91434, which requires all APV systems to maintain 66% of the original agricultural yield (called the reference yield) and limits the amount of arable land lost to solar infrastructure to up to 15%. The standard ensures agriculture remains the top priority of APV development – even if the energy returns are high.

India can draw on these examples to define its national APV guidelines, including specifications on panel height, permissible yield loss, and land-use criteria. Such guidelines will be key to keep energy management from overshadowing agricultural interest, especially at scale.

## Smallholder inclusion

Most Indian farmers are smallholders,

**Solar plants within KUSUM could consider implementing models with infrastructure that allows crops to be cultivated simultaneously. This will allow India to take advantage of existing policy platforms to test and accelerate innovation**

owning less than 2 ha of land each, and have limited purchasing power. Scaling APV for smallholders will require leveraging farmer institutions such as FPOs and cooperatives. Sahyadri, one of a few FPOs in India to install a 250-kW APV system, is cultivating high-value crops like grapes and citrus lemon under solar panels. It shows how institutions can help farmers pool resources and provide stronger market linkages.

Expanding institutional support – through grants or NABARD's credit guarantee for APV investments – can also lower financial barriers to smallholders. Indeed, the primary bottleneck for APV adoption in India is the high capital expenditure required for APV systems. While a typical 1-MW ground-mounted solar plant in 5 acres of land would cost around ₹2.7 crore, an APV system will incur an additional 11% due to the specialised infrastructure it requires. So without a remunerative feed-in tariff (FIT), the economic viability of APVs remains uncertain.

For instance, under the current FIT of ₹3.04/unit in Rajasthan's PM-KUSUM scheme, the payback period for a 1-MW

ground-mounted solar plant will be 15 years.

But a higher FIT based on the thermal average power purchasing cost for the State Discoms of ₹4.52/unit, the payback period will drop to four years. Such attractive FITs could incentivise farmers and investors to invest in APVs.

The government can also float capacity-building programmes that train and equip farmers with the expertise to manage APV systems.

## Two pillars

India currently doesn't have any designated policy on agrivoltaics.

There is an opportunity, however: a revamp of the Government of India's flagship PM KUSUM scheme on agricultural solarisation to accommodate APVs in its delivery system could help scale the innovation across the country.

Solar power plants as commissioned within the grid-connected components of the scheme could also consider implementing models with infrastructure that allows crops to be cultivated simultaneously.

This will allow India to take advantage of existing policy platforms to test and accelerate innovation.

Success in the long run, however, still depends on two pillars: strong economic incentives for investors and a robust, farmer-centric policy framework.

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## THE GIST

APVs integrate energy generation with agricultural production, offering a model that maximises land-use efficiency while augmenting income. Farmers can move energy back to the grid, forging new streams of income

India lacks norms for APVs. Japan requires all structures to be temporary and removable and permits a maximum crop yield loss of 20%. Germany requires all APV systems to maintain 66% of original agricultural yield

Scaling APV will require grants and credit. Indeed, the primary bottleneck for APV adoption is capital expenditure. Without a remunerative feed-in tariff, the viability of APVs remains uncertain

# Genome-edited seeds to mark beginning of second Green Revolution: Chouhan

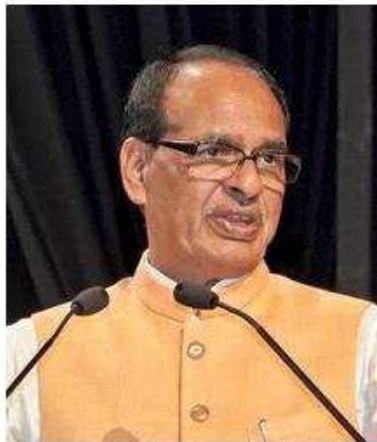
**The Hindu Bureau**

NEW DELHI

Union Agriculture Minister Shivraj Singh Chouhan on Sunday announced the development of two genome-edited rice varieties, and said the technological advancement would lead to a second Green Revolution in the country.

“After the laboratory cultivation, breeder seeds will be developed, and after multiplying breeder seeds, certified seeds will be given to farmers. The process generally takes four or five years. We are trying to reduce this time,” he said, speaking to reporters after an event at the Indian Council of Agricultural Research (ICAR) to felicitate the scientists involved in the development of the new seeds.

He said the vision for a



Shivraj Singh Chouhan

developed nation was being realised, and farmers were moving towards prosperity. “Today’s achievement will be written in golden letters. During the Azadi Ka Amrit Mahotsav, Prime Minister Narendra Modi had called upon farmers to adopt modern techniques to overcome agricultural challenges. Inspired by his words, ICAR scientists have made exceptional achievements in

the field of agriculture with the creation of these new varieties,” he said.

## **Two benefits**

“It will save irrigation water and reduce greenhouse gas emissions, thereby lowering environmental pressure. This is a classic example of getting both benefits - increased production and environmental conservation,” the Union Agriculture Minister said.

ICAR Director-General M.L. Jat said demand-driven research should be promoted, adding that there was a need to gather feedback from farmers about their specific requirements. “This approach will ensure that research outcomes are tailored to meet the needs of farmers and effectively reach them with the right solutions,” he said.



# Rise of sporting culture will boost India's soft power: PM

Modi inaugurates 7th Khelo India Youth Games, says the government has always given top priority to sports in its policies; he underlines the efforts to bring the Olympics to the country in 2036

**Amit Bhelari**  
PATNA

**P** rime Minister Narendra Modi on Sunday said India's soft power will increase with the growth of a sporting culture in the country. He was addressing the inaugural ceremony of the seventh Khelo India Youth Games via videoconferencing.

The Khelo India Youth Games, 2025 is being organised in Bihar for the first time from May 4 to 15 in five districts.

Addressing the athletes, coaches, and staff members present at the event, he remarked that players from across the country had gathered, showcasing exceptional talent and determination.

He extended his best wishes to all the players, emphasising that sports in India was now evolving into a distinct cultural identity.

"As India's sporting culture grows, so will the country's soft power on the global stage," Mr. Modi said, underscoring the significance of the Khelo India Youth Games in providing a major platform for



**Big draw:** Spectators during the inauguration ceremony of the Khelo India Youth Games at the Patliputra Sports Complex in Patna on Sunday. PTI

the nation's youth.

He reiterated that the government had always given top priority to sports in its policies.

Stressing that hosting the Olympics in India has been a long-cherished dream of every citizen, Mr. Modi underlined India's efforts to bring the Olympics to the country in 2036.

He remarked that initiatives like Khelo India and the Target Olympic Podium (TOP) scheme have contributed to building a robust sports ecosystem,

benefiting thousands of athletes across Bihar and the rest of the country.

Mr. Modi also acknowledged the growing presence of Indian athletes in new and emerging sports such as Wushu, SepakTakraw, Pencak Silat, Lawn Bowls, and Roller Skating.

The Prime Minister highlighted the government's focus on modernising India's sports infrastructure. He said the sports budget had increased more than threefold, reaching approximately

₹4,000 crore this year, with a significant portion allocated to infrastructure development.

Mr. Modi acknowledged the establishment of the Khelo India State Centre of Excellence in Rajgir and institutions such as Bihar Sports University and the State Sports Academy.

Bihar Chief Minister Nitish Kumar and Union Sports Minister Mansukh Mandaviya were present at the Patliputra Sports Complex, where the main function was organised.



# India is looking for partners, not preachers: External Affairs Minister

'We have not told one or the other party to do this or do that, and that is important to remember because that is a courtesy that is not always granted to us. We get advice on what we should be doing,' Jaishankar said in a dig at the West while speaking at the Arctic Circle India Forum in Delhi

Press Trust of India  
NEW DELHI

India is looking for "partners" and not "preachers", External Affairs Minister S. Jaishankar said on Sunday, in a veiled message to Europe in the context of the conflict in Ukraine as he explained the nuances of New Delhi's "Russia realism" and why the relationship between the two sides was an "important fit".

In an interactive session, Mr. Jaishankar, delving into broader geopolitical upheavals, said Europe had "entered a certain zone of a reality check" and must display some sensitivity and mutuality of interest for deeper ties with India.

India has always advocated for "Russia realism" and there was an "important fit" and "complementarity" between India and Russia as a resource provider and consumer, the Minister said, in remarks that came amid persistent efforts by U.S. President Donald Trump's administration to strike a ceasefire deal between Moscow and



Clear stand: S. Jaishankar speaks at the Arctic Circle India Forum 2025 in New Delhi on Sunday. ANI

Kyiv. Over the course of the Russia-Ukraine conflict, New Delhi has remained engaged with Moscow and enhanced its procurement of Russian crude oil, which triggered criticism from the West. India, however, maintained that its ties with Russia are driven by national interest.

## 'Russia not involved'

The Minister also criticised earlier attempts by the West to find a solution to the Russia-Ukraine conflict without involving Russia, saying it "challenged the basics of realism".

"Just like I am an advocate of Russia realism, I am also an advocate of America realism," he said at the Arctic Circle India Forum.

"I think the best way to engage today's America is also through finding mutuality of interests rather than putting ideological differences upfront and then allowing it to cloud the possibilities of working together," Mr. Jaishankar said.

The Minister was broadly delving into the global consequences of developments in the Arctic and how the changing world

order impacts the region.

On the Russia-Ukraine conflict, Mr. Jaishankar said India has always been "very careful not to prescribe a solution".

"We have not told one or the other party to do this or do that. And that is important to remember because that is a courtesy that is not always granted to us. So, we get advice on what we should be doing," he said, in another dig at the West.

Answering a question on India's expectations from Europe, Mr. Jaishankar said it had to get

beyond preaching, and to start acting based on a framework of mutuality.

"When we look out at the world, we look for partners; we do not look for preachers, particularly preachers who do not practice at home and preach abroad," he said. "I think some of Europe is still struggling with that problem. Some of it has changed," he added.

The Minister said Europe had "entered a certain zone of reality check". "Now, whether they are able to step up to it or not, it is something we will have to see," he added.

"But from our point of view, if we are to develop a partnership, there has to be some understanding, there has to be some sensitivity, there has to be a mutuality of interest, and there has to be a realisation of how the world works," he noted.

"And I think these are all work in progress to differing degrees with different parts of Europe. So, some have moved further, some a little bit less," Mr. Jaishankar said.

On India-Russia ties, he

said there was such an "important fit and complementarity" between the two countries as a "resource provider and resource consumer".

"Where Russia is concerned, we have always taken a view that there is a Russia realism that we have advocated," the Minister said.

"When passions were very high [in] 2022, 2023... if one looks back at that period, the kind of predictions and scenarios which were put forward have turned out not to be well-founded," he said.

The Minister criticised the thinking of the West in the past that a solution to the conflict in Ukraine could emerge without involving Russia. "The idea that you will get a solution out of Russia without inviting Russia challenged the basics of realism," he said. "I think for us, to engage Russia, if there is anyway we can be of help, we have always been very open about it," Mr. Jaishankar said, adding, "Having said that we have always been very careful not to prescribe a solution."

