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With a team of dedicated professionals based at its office in New Delhi, the Foundation works with partners and associates both in India and overseas to further its stated objectives.

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The India Foundation Journal is led by an Editorial Board of eminent scholars and leaders from various spheres of Indian public life. The bi-monthly journal covers a wide range of issues pertinent to the national interest, mainly focusing on international relations, national security, legal and constitutional issues and other issues of social, religious and political significance. The journal seeks articles from scholars with the intent of creating a significant body of knowledge with a nationalist perspective and establish a recognised forum for debates involving academicians and policymakers.

Climate, Development, and Security: A Framework for Climate-Resilient Development

Dhruv C Katoch*

There was a time when development goals were pursued without considering environmental consequences. Examples are abundant. The construction of the Panama Canal between 1880 and 1914 brought significant economic, strategic, and technological benefits, revolutionising global trade by enabling shorter shipping routes and lower transportation costs. However, it also caused immense human suffering and long-term ecological damage to the isthmus. Similarly, rapid industrialisation and unchecked factory expansion during the Industrial Revolution in late 18th to 19th-century Europe and the U.S. led to urban air and water pollution, widespread deforestation, and health crises in many cities. Colonial plantation and mining projects across Africa, Asia, and Latin America, aimed at exploiting land for rubber, cotton, and minerals, resulted in extensive deforestation, soil exhaustion, social displacement, and cultural loss.

Recently, we have seen many man-made disasters resulting from a lack of foresight in addressing environmental issues. The deadly radiation leaks at Chernobyl Nuclear Power Plant in the former USSR in 1986 and the Bhopal gas tragedy in 1984, which killed thousands and continues to cause environmental and health problems, serve as clear examples. The Three Gorges Dam in China displaced over a million people and significantly altered river ecosystems. Similarly, the Aswan High Dam in Egypt in the 1960s reduced Nile fertility, led to declining fisheries, and prompted the relocation of Nubian communities.

Clearly, environmental issues must be integrated into economic and security considerations. The occurrence of ecological disasters, however, does not diminish the significance of security or development concerns. Instead, all three must be addressed together. The discussion can never be about choosing between development, security, or environmental preservation. It is not a zero-sum game in which one is prioritised at the expense of the others. All three are vital concerns.

In India, a controversy recently surfaced when Ms Sonia Gandhi, the matriarch of the country's leading opposition party, published a sharp article criticising the Great Nicobar Island Development Project (GNIDP), also known as the "mega-project on Great Nicobar".[1] Calling the Rs 72,000 crore initiative a "planned misadventure," she writes that the project threatens the existence of the island's indigenous tribal communities, endangers one of the world's most unique flora and fauna ecosystems, is highly susceptible to natural disasters, and has been hastily approved without adequate legal and social safeguards. While subtly recognising the project's strategic and economic value, she asserts that the disaster risk far exceeds the potential benefits.

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This form of extreme positioning is equally disruptive. We have seen instances where environmental issues have been weaponised to stall development projects. The Narmada Bachao Andolan (NBA) is a prime example. The movement emerged in opposition to the construction of dams on the Narmada River, particularly the Sardar Sarovar Dam in Gujarat. The dam was finally inaugurated in 2017, after decades of dispute that began in 1985. While genuine social and environmental concerns may have initially driven the NBA, it soon deteriorated into ideological opposition to large-scale projects. It was influenced by foreign actors, especially Western NGOs and advocacy groups, which funded the protests to advance their own interests. Emotional imagery from the NBA highlighted the negatives, showing submerged villages and the poor on hunger strikes. They received celebrity endorsements, but the movement was city-led, with the emotional narrative overpowering factual assessment.

A fact-check of the Sardar Sarovar Project, comparing the NBA's claims to the actual outcomes, is enlightening. The NBA claimed that over 3 lakh families would be permanently displaced; however, fewer than 2 lakh people were affected, and nearly all received land-for-land compensation. Many displaced communities gained access to schools, electricity, and healthcare for the first time. The NBA also exaggerated the environmental impact, claiming massive deforestation and ecological collapse, but no such large-scale loss of biodiversity was recorded after stabilisation. On the benefits side, the project resulted in over 18 lakh hectares of land irrigated, piped water reaching millions of homes, and a surge in power generation capacity. An independent cost-benefit analysis by IIM Ahmedabad in 2018 found a benefit-to-cost ratio of over 2.5:1 over 30 years, indicating a significant net public gain.[2] Surveys by the Centre for Social Studies (CSS), Surat (2016) found improvements in income, education, and access to services for most resettled households compared to pre-submergence levels. All this indicates broad positive social outcomes, though, of course, some localised grievances remain.

This is not to imply that environmental concerns are unimportant. They are vitally important, and including them in the development agenda is part of the process. Ignoring environmental issues harms society, but so does a lack of development and neglect of security issues. A comprehensive approach must include all three. That is why Ms Sonia Gandhi's article is problematic. Its focus is singular, dealing only with the threat to the environment. The mitigation strategies that form part of the project have not been mentioned. The economic and strategic payoffs that the project brings to the nation have also not been highlighted.

When environmental concerns outweigh security and development priorities, we risk undermining national interests, thereby favouring hostile external powers. A notable example is Vedanta's Sterlite copper smelter in Thoothukudi, Tamil Nadu, which in 2018 was forced to shut down by activists organising protests over alleged severe environmental pollution. Consequently, India, which had previously been a net exporter of refined copper, became a net importer. In 2023,

the Tamil Nadu governor, Mr RN Ravi, claimed that the anti-Sterlite protests in 2018 had been funded by foreign interests and aimed at hindering progress.[3] Regardless of whether the Governor's claim is valid, the fact remains that the shutdown was not in the country's best interests. Environmental concerns should have been adequately addressed; the shutdown was unwarranted.

Earlier, in Tamil Nadu, organised protests by NGO's against the Kudankulam Nuclear Power Plant (KKNPP) in Tirunelveli district took place between 2011 and 2013. The protesters heightened fears about the potential for a nuclear disaster and radioactive contamination of the sea, despite the Indian government and Atomic Energy Commission asserting that the plant was safe, modern, and vital for India's energy security. In an interview given to Science Magazine in 2012, the then Prime Minister, Dr Manmohan Singh, stated that, "The atomic energy programme has got into difficulties because these NGOs, mostly based in the United States and Scandinavian countries, don't appreciate the need for our country to increase the energy supply."[4] He suggested that some NGO's received foreign funds to fuel opposition to the plant. This charge would not have been made lightly. It had much to do with geopolitical and commercial rivalries between Russia and Western countries. The KKNPP was built under an India–Russia intergovernmental agreement in 1988 and 1998. Moscow also offered to build up to six reactors at Kudankulam. After the U.S.–India Civil Nuclear Agreement of 2008, Western companies seeking major reactor contracts in India were believed to be behind these protests to undermine Russia's first-mover advantage. While all this is speculative, there is enough evidence to suggest that environmental issues can be weaponised to impede a country's growth.

Environmental concerns were also used to slow down infrastructure development in Eastern Ladakh and in Arunachal Pradesh. This worked to China's advantage, which had developed its communication infrastructure right up to the LAC. Thankfully, over the past decade, a lot of effort has gone into addressing the shortcomings of earlier years, as a result of which India is today better prepared to take on any hostile military action by China.

Let us now examine what the GNIDP project involves and why it is vital for India. The Andaman & Nicobar Islands have immense strategic value because of their location near the Six Degree Channel and the Malacca Strait, which is perhaps the world's busiest shipping lane connecting the Indian and Pacific Oceans. While Indian policymakers recognised the strategic importance of the A&N Islands, it was only in the early 1980s that the Indian Navy began modest infrastructure development at Port Blair. Later, in 2001, India established its first tri-service command—the Andaman & Nicobar Command (ANC) —thus signalling its strategic intent. But further development remained limited and piecemeal, primarily due to environmental concerns. There was also an element of strategic caution. India, in line with its policy of "strategic restraint", kept a low profile, using the Islands for surveillance and not for forward deployment. In addition, limited funding, lack of political backing and a single unified authority over the A&N Islands slowed decision-making. Consequently, a larger strategic vision

encompassing an economic and defensive charter for the Island chain, in line with its strategic potential, did not materialise.

With the change in government in 2014, India's maritime and strategic thinking also shifted. China's growing presence in the Indian Ocean is a source of concern, and the Andaman and Nicobar Islands are key to countering Chinese designs. This also aligns with India's Act East Policy, its strategic cooperation with the Quad and ASEAN, and the economic rationale for making a transhipment terminal to rival Singapore and Colombo. The Great Nicobar Mega Infrastructure Project, conceived by NITI Aayog and implemented through the Andaman and Nicobar Islands Integrated Development Corporation (ANIIDCO), marks the first comprehensive attempt to combine national security objectives with regional economic development in the Bay of Bengal by making the islands into a strategic economic hub.

The development spans approximately 166 km² over the next 30 years. The main elements of the project include constructing an International Container Transhipment Terminal (ICTT) at Galathea Bay on the eastern side of Great Nicobar, with a capacity of 16 million TEU once completed. The initial phase will handle 4 million TEU. Its location near the Six Degree Channel and the Malacca Strait, along key shipping routes, provides India with a strategic maritime transhipment hub. There will also be a dual-use Greenfield International Airport capable of handling both civil and military traffic, with a capacity of 4,000 passengers per hour during peak times by 2050. Additionally, a power plant and supporting infrastructure will be developed. Two new greenfield cities — one at Campbell Bay and another at Galathea Bay — are included in the project, which will also feature a cruise ship terminal, luxury tourism resorts, and an industrial hub.

The concerns raised by Ms Sonia Gandhi in her article are well known. The Galathea Bay development area covers 18 per cent of the entire region of Great Nicobar Island (GNI). The tropical evergreen rainforests are part of UNESCO's Great Nicobar Biosphere Reserve. Development of the area will impact coastal morphology, coral ecosystems, and the tribals. However, all these issues have been considered, and mitigation strategies are in place. An environmental mitigation framework exists, including regulatory oversight and phased approvals, scientific assessment and redesign, and offset and compensatory measures. The development project is not denying environmental risks. Instead, it addresses these challenges through adaptive, evidence-based governance that balances strategic needs with ecological responsibility.

The national focus should therefore be on completing the project on time while implementing responsible ecological measures. The project is transformative. By integrating its economic and strategic potential with environmental considerations, India can strengthen its presence in the Indian Ocean region and ensure that the oceans remain free, open, and inclusive for all. The approach used for the Great Nicobar Island Development Project (GNIDP) can serve as a model, demonstrating how security, economic growth, and environmental protection are crucial elements of development and can be combined to pursue national progress.

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Enacting India's Competitiveness: Is Climate Transition an Enabler or an Impediment?

Amit Kapoor & Meenakshi Ajith*

The true test of a nation is not how it thrives in calm conditions, but how steadfast it remains when storms hit. Alongside the rest of the world, India has endured a pandemic, navigated global economic shocks, and continues to face converging climate threats, including heatwaves, floods, cyclones, and droughts that occur simultaneously or in succession. This has now become the rhythm of a new era. In such times, competitiveness can no longer be measured solely by GDP or export figures. A country that grows rapidly but collapses after every climate crisis can no longer be deemed "competitive" in any meaningful sense. The new metric for inclusive growth and prosperity is resilience: the capacity to address climate risks, safeguard livelihoods, and maintain growth even amid cascading crises.

Measuring growth through competitiveness gained global attention in the late 20th century, as nations started to evaluate themselves not just by raw growth but by their capacity to innovate, attract investment, and boost exports. Michael Porter's The Competitive Advantage of Nations (1990) formalised this idea, suggesting that national prosperity depends on the interaction of factor endowments, demand conditions, industrial ecosystems, and firm rivalry[1].

Competitiveness has become the guiding principle of economic policy in an era driven by globalisation, trade liberalisation, and rapid technological innovation. Today, the forces of trade and technology have only become more transformative in their effects. Artificial intelligence, digital platforms, and evolving global supply chains are reshaping the landscape of competitiveness as profoundly as container shipping or the internet once did. Countries are now judged not only by their production efficiency but also by how quickly they can adapt to disruptive changes.

In India, the 1991 reforms marked a decisive shift away from inward-looking policies and toward global integration. At that time, competitiveness became linked with liberalisation, efficiency, and market dynamism. The consistent rise in GDP growth rates, the surge in IT and services exports, and the significant expansion of the middle class were seen as signs of competitive growth. However, as time went on, the world changed, and history also shows us that the standard of progress can never stay the same.

The evidence is now more apparent than ever. According to the World Bank's *People in a Changing Climate* (2023), labour productivity losses from heat stress already average 5.7 per cent in lower-middle-income countries: a category that includes India and is projected to rise further as global temperatures increase[2].

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By 2030, heat stress alone could cost India the equivalent of 34 million full-time jobs or nearly USD 450 billion in lost economic output, according to estimates by the International Labour Organisation[3]. This is not an abstract risk, but a lived reality for construction workers, agricultural labourers, and millions in the informal sector, whose productivity underpins India's competitiveness.

Agriculture, still the livelihood foundation for over 40 per cent of the Indian workforce, faces severe vulnerability. The CCDR notes that climate variability could reduce farm incomes in unirrigated areas by up to 25 per cent. Recurring floods in Assam, the droughts of Bundelkhand, and the 2019 Chennai water crisis are not isolated incidents, but they demonstrate how climate extremes are transforming India's economic landscape. For example, Cyclone Amphan in 2020 caused damages of USD 13 billion, overwhelming state budgets and revealing the fragility of infrastructure systems. In 2023, flash floods in Himachal Pradesh led to losses exceeding USD 1.5 billion, while record-breaking heatwaves disrupted sowing cycles across India's food belt. The fiscal costs are equally alarming. Between 2010 and 2020, India lost USD 87 billion annually to climate-related disasters, equivalent to nearly 3 per cent of its GDP (World Bank, 2023). These shocks repeatedly force governments to divert resources from development spending to relief and recovery, locking public finance into a cycle of reaction rather than preparation.

Competitiveness is therefore not just about the speed of growth but also about the durability and inclusivity of economic progress. This redefinition emphasises the importance of climate transition to India's development path. It shifts the discussion from viewing climate policy as a cost to recognising that climate inaction is the real obstacle to competitiveness. A nation that invests in climate-smart agriculture, resilient infrastructure, and adaptable social protection is not engaging in "green spending"; it is safeguarding the very foundations of its economic strength. The good news is that advances in technology, from digital platforms to artificial intelligence, have created entirely new and more effective pathways for a climate transition—whether in clean energy deployment, precision agriculture, or adaptive infrastructure. The bad news is that the speed and scale of action still fall far short of the urgency of the crisis.

Before examining whether climate transition is an impediment or an enabler of competitiveness, it is crucial first to understand what such a transition in India entails: the risks it must address, the opportunities it creates, and the structural shifts it necessitates. To explore these questions, the following sections first analyse the current state of India's competitiveness. It then outlines the contours of India's climate transition, including the commitments, policy instruments, and structural changes involved. Ultimately, it examines whether and under what circumstances the climate transition can serve as an enabler of competitiveness rather than an obstacle.

The Competitiveness Landscape in India Today

India's growing economic stature is now attracting global attention. With estimates showing it as the world's fifth-largest economy in nominal GDP and third in purchasing power parity, India's rise appears robust, with an annual GDP growth

rate of 6.5% in 2024.[4] While these headline figures indicate scale, they often mask more fundamental questions: What does this growth imply for productivity? How inclusive and widespread is this economic expansion? India's global rankings across economic indices in 2024 depict a picture of rising stature but uneven foundations. The country is home to one of the fastest-growing populations of millionaires and billionaires, and four of its cities are now among the fastest-developing globally. However, this outward economic momentum contrasts with weaker performance on competitiveness, innovation, and talent development. These gaps suggest that while India advances in headline metrics, the core enablers of productivity remain underdeveloped. This is especially apparent when considering GDP per person employed, a key measure of how efficiently an economy converts labour into output. In this regard, India continues to lag considerably behind both global and middle-income counterparts.

As of 2024, India's GDP per employed person was about $24,468, a slight rise from $23,700 in 2023. This figure remains well below the average for middle-income countries, which stood at $34,243, and is significantly less than China, which has exceeded $45,494—almost double India's level. Even within the lower-middle income group, India is only marginally above the group average of $22,178, highlighting the structural challenges in turning labour input into economic output[5].

This productivity gap is not just a sign of slower growth but indicates deeper economic inefficiencies. In 2024, India's GDP per capita (PPP, constant 2021 international $), which reflects living standards and economic productivity, was $9,817, showing steady growth since 2015 but still trailing behind other emerging economies: China at $23,846 (2.4 times higher), the global average at $21,268, and the middle-income group at $14,902. India is only slightly above the lower-middle-income average of $8,789, highlighting limited progress in catching up. While Brazil ($19,648) and Indonesia ($14,470) maintain stronger positions, South Africa has stagnated but remains ahead of India[6].

The broader trend indicates India growing faster than the global average, but from a very low base, narrowing gaps significantly and highlighting ongoing productivity and structural challenges. This issue is further emphasised by its low employment-to-population ratio. In 2024, India's employment-to-population ratio was just 53.2 per cent, notably lower than China's 62.4 per cent and the average for middle-income countries of nearly 58 per cent[7].

This divergence between size and prosperity highlights the deeper challenge we face: growth alone does not equal competitiveness, and GDP does not automatically lead to shared prosperity. Competitiveness is crucial today because the rules of the global economy are being rewritten. We live in an era of structural change: supply chains are being shortened, reshored, and reconfigured for geopolitical resilience; technology is advancing, with AI being called the new electricity; climate change and multiple crises, from pandemics to conflicts, are reshaping risks. In this turbulence, traditional levers of cost and scale, which emerging economies like India have long relied upon, are no longer enough. What global markets now value are productive ecosystems, policy coherence, and

predictability. Being cheap is not sufficient; what matters is how well systems function together. That is what distinguishes countries that merely grow from those that prosper.

India, in many ways, is uniquely positioned in this flux. It is the only economy with the potential to offer an alternative to China in manufacturing, the scale to become a vast consumer democracy, and the digital infrastructure to serve as a laboratory for the future. However, potential is not performance. As Michael Porter's framework reminds us, real competitive advantage is engineered: it is built on factor conditions like skills and infrastructure, on sophisticated demand that pressures firms to upgrade, on clusters that integrate suppliers and innovators, and on institutions that enable healthy rivalry.

Even as India grapples with the fundamentals of competitiveness — skills, clusters, demand, institutions, etc. — a bigger question looms: how will all this unfold in the context of the climate transition? Competitiveness today cannot be separated from decarbonisation. The global economy is no longer indifferent to carbon; trade regimes, investment flows, and consumer preferences are increasingly influenced by climate considerations. Europe's Carbon Border Adjustment Mechanism, the surge of green subsidies in the United States, and the race for critical minerals all demonstrate how climate imperatives are becoming part of the very structure of competition.

For India, therefore, the climate transition is not an external constraint layered onto its growth story. It is part of the playing field on which competitiveness itself will be decided. The challenge of building clusters is also the challenge of building clean-energy ecosystems that can deliver reliable power without locking in existing infrastructure. The push for sophisticated domestic demand is also about whether rising households can afford and demand efficient appliances, electric vehicles, and renewable rooftop systems. The search for advanced factors is equally the search for climate-ready/green skills: engineers for green hydrogen, technicians for battery storage, regulators for carbon markets. Even India's diplomatic posture, so crucial for securing capital and technology, is now shaped by climate alliances and green finance norms.

Viewed this way, the climate transition is not a separate goal from competitiveness but a fundamental current running through it. It will determine whether India's manufacturing resurgence can integrate into future value chains or be left behind in carbon-intensive industries; whether its cities can attract investment or become overwhelmed by heat and pollution; whether its fiscal health can be maintained through green finance or strained by reliance on fossil fuels. In essence, climate is not just another item on the reform checklist; it is the foundation on which India's competitiveness will be built.

This is not only because trade and technology are becoming climate-dependent, but also because climate change itself has deep economic and productivity consequences. It is no longer just an environmental issue; it is a fundamental economic risk that affects growth, welfare, and competitiveness. Research worldwide highlights two main ways climate change harms economic performance: the slow but constant effects of

rising temperatures and changing rainfall, and the recurring shocks of extreme events such as floods, cyclones, and heatwaves. Both reduce productivity by lowering agricultural yields, decreasing labour output, damaging infrastructure, and straining health systems. For India, these risks are amplified by structural vulnerabilities. With 43% of the workforce still employed in agriculture and much of industry dependent on outdoor labour, productivity losses due to heat and rainfall variability are already considerable.

The ILO estimates that by 2030, South Asia could lose over 5% of working hours due to heat stress alone, which could result in millions of jobs disappearing in India's most labour-intensive sectors[8]. Extreme events are also intensifying cyclones along the eastern coast, causing recurrent flooding in the Gangetic plains and water shortages in central India. These issues disrupt output, damage infrastructure, and lead to significant costs for relief and reconstruction. Different states and districts face varying levels of exposure. Bihar and Odisha, for example, frequently experience floods and cyclone impacts, while Rajasthan and Maharashtra deal with heatwaves and drought. This uneven vulnerability results in regional differences in productivity setbacks, highlighting India's already stark disparities in growth.

The message is clear: without climate resilience, competitiveness cannot be sustained. Productivity losses caused by rising temperatures and repeated shocks threaten to eliminate the very gains India aims for in manufacturing growth, labour participation, and infrastructure development. Essentially, the route to competitiveness must also include climate adaptation and mitigation efforts, such as safeguarding workers from heat stress, constructing resilient infrastructure, investing in early warning systems, and incorporating climate risk into fiscal and industrial strategies.

Therefore, if unmanaged climate risks undermine productivity and increase vulnerability, a carefully planned climate transition can significantly boost India's competitiveness. By speeding up renewable energy and storage, India can reduce input costs and improve energy security; through investing in green industries like batteries, hydrogen, and circular economy models, it can access new export markets; and by building resilience in agriculture, cities, and infrastructure, it can protect productivity and mitigate fiscal shocks. In this way, the climate transition is not just about achieving emission targets but also about creating the advanced factors, resilient clusters, and policy consistency that Porter recognised as the hallmarks of competitive economies.

At the same time, while the transition provides an enabling platform, its true potential will only be realised if it is effectively directed and integrated with India's broader development goals of jobs, equity, fiscal stability, and inclusive growth. The next section explores this issue: how the climate transition, if strategically implemented, can act not as an obstacle but as a catalyst for India's long-term competitiveness.

Harnessing the Climate Transition for Competitiveness

Competitiveness is not about being the cheapest, but about creating conditions where firms and regions can continually improve through skills, innovation, and efficient ecosystems. Viewed this way, the climate transition is not an external

imposition but a driver for such improvement. Moving to clean energy, for example, is not just about reducing emissions; it is about lowering the volatility of imported fuel costs, enhancing reliability for industries, and encouraging domestic manufacturing in renewables and storage. Each of these outcomes helps build advanced factor conditions such as reliable infrastructure, energy security, and a skilled labour force that support competitiveness much more profoundly than short-term cost advantages.

Global markets now require low-carbon, circular products, with mechanisms such as the EU's Carbon Border Adjustment making climate standards essential for market entry. For Indian exporters, this is a matter of survival but also an opportunity: the pressure to reduce carbon emissions can encourage improvements in processes, supply chains, and product quality. Domestic demand is shifting similarly, from solar to clean mobility, aligning internal and external incentives. Climate action, therefore, is not separate from competitiveness; rather, it forms its foundation by fostering resilience, productivity, and innovation.

One of the clearest pathways is through the circular economy. India is at a point where material demand will triple by 2040, much of it in construction, mobility, and consumer goods. A linear "take, make, waste" model would entrench dependence on imports, increase resource volatility, and lead to waste management crises. Circular models, where materials are reused, products are designed for durability, and waste is considered a feedstock, offer a competitive alternative. They lower costs by reducing material and energy use and create new markets for repair, refurbishment, and recycling. This approach is not only environmental but also industrial. It enhances domestic secondary-materials supply, decreases reliance on geopolitical shocks regarding critical minerals, and fosters employment-heavy clusters in recycling, reverse logistics, and remanufacturing. For companies, circular practices open access to export markets where recycled content and traceability are increasingly mandatory. For consumers, they mean products that last longer and have lower lifecycle costs. In essence, circularity turns ecological limitations into an opportunity for competitiveness.

Climate shocks already strain India's public finances through disaster recovery, energy subsidies, and costly fossil fuel imports, crowding out investment in skills and infrastructure. Transitioning to renewables can reverse this trend: solar and wind are now the cheapest power sources, and scaling them while reducing fossil fuel subsidies would stabilise budgets, lower input costs, and free resources for research, skills, and logistics. Green bonds and blended finance can further mobilise private capital without overburdening the state. For heavy industries, decarbonisation is crucial to stay within global value chains. Climate-resilient infrastructure and early-warning systems serve as productivity insurance, protecting workers, reducing downtime, and maintaining the foundations of competitiveness.

The employment dimension completes the main argument. For a country where millions of young people enter the labour market each year, the climate transition can generate jobs if directed properly. Clean energy, repair and refurbishment sectors, recycling, and sustainable agriculture are all more labour-intensive than the extractive, linear models they replace. Incorporating India's

extensive informal workforce into these emerging sectors can provide decent, productive work while improving skills across the board. Recognition of prior learning, micro-certification, and easier access to credit can help informal workers join formal circular and clean-tech economies. This not only increases the pool of skilled workers but also promotes competitiveness through inclusion, ensuring growth is wide-reaching and socially sustainable.

The international dimension amplifies these effects. In a world where trade, investment, and technology flows are increasingly influenced by climate issues, India's diplomatic stance can shape the external environment in ways that enhance domestic competitiveness. By championing initiatives like the International Solar Alliance, the Coalition for Disaster Resilient Infrastructure, and the LiFE agenda, India projects its developmental vision onto the global stage. This is not merely soft power; it is a form of economic strategy. By influencing norms around finance, technology, and lifestyle, India safeguards policy space domestically while creating opportunities internationally. Climate diplomacy thus becomes a tool for competitiveness: it ensures access to technology and markets, shields against restrictive standards, and establishes India as a key player in shaping the low-carbon order.

None of this will happen automatically. The risk is that the climate transition stays fragmented with pilot projects that never expand, industrial policies that generate rents instead of fostering rivalry, and disparities at the state level that increase rather than decrease. Competitiveness demands coherence. It requires aligning industrial policy with trade strategy, fiscal tools with innovation incentives, and climate goals with development objectives. It also requires institutionalising predictability, so investors can trust that current standards and tariffs will not be arbitrarily changed tomorrow. Most importantly, it involves treating climate not as an addition to the growth narrative but as the core logic shaping competitiveness itself.

When viewed this way, the climate transition ceases to be a trade-off. It becomes the means by which India can reconcile growth, resilience, and global integration. Circular models transform waste into resources and costs into competitiveness. Renewable energy reduces input costs and stabilises fiscal space. Climate resilience shields productivity against shocks. Green jobs and inclusive skills secure prosperity within social stability. Diplomacy turns India's domestic pathway into global influence. Each of these elements enhances the fundamentals of competitiveness, such as better factors, increased demand, denser clusters, and sharper rivalry. Together, they can convert India's favourable position into a sustained competitive advantage.

The climate transition, then, is not just compatible with competitiveness; it is essential for it. However, its potential will only be realised if it is guided with purpose and coherence, aligned with broader development goals, and integrated into industrial, fiscal, and social policies. Done effectively, it can transform India into not just a large economy but a competitive one that is productive, resilient, and prosperous on its own terms.

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Cleantech Manufacturing for India's Pathways for *Viksit Bharat*: Can *Swadeshi* Lead the Way?

Jagjeet Singh Sareen*

India is at a critical juncture in its transition to clean energy. The nation has set ambitious targets: achieving net-zero emissions by 2070, sourcing 50% of its energy from non-fossil fuels by 2030, and ensuring that 30% of new vehicles sold by 2030 are electric. Currently, India's total installed energy capacity stands at 442 GW, with renewable sources comprising 33% and hydropower contributing 11%. Due to the rapid expansion of renewable energy installations, India remains confident in meeting its 2030 clean energy objectives ahead of schedule.

India's progress has primarily stemmed from clear and targeted policy incentives. Between 2010 and 2023, the country's renewable energy capacity grew eightfold, driven by supportive government policies and declining costs of solar and wind technologies. These policies, alongside financial innovations, have encouraged more venture capital investments and created more opportunities for startups and MSMEs. As a result, cleantech expenditure reached USD 68 billion in 2023, a 40% rise compared to the average from 2016 to 2020.

However, these ambitions bring their own set of challenges—chief among them is reducing India's reliance on imported cleantech components. India's cleantech manufacturing import dependence across renewable energy, electric mobility and other cleantech sectors' value chains vary from 20% to 90%; specifically, 80% in Solar, 60% in Wind, 75-90 % in Battery Energy Storage Systems, 60-70% in E-mobility (EV motors and controllers), 90% in Green Hydrogen, and 20-30% in Bio-energy sectors. Without decisive policy action, India's cleantech imports could surge to USD 85–110 billion by 2030 and as high as USD 140–300 billion by 2040, rivalling the country's current oil import bill. Reducing this dependence and capturing the economic benefits of the green transition requires indigenizing supply chains and establishing a robust domestic manufacturing base. Policy must address capital costs, supply chain bottlenecks, and constraints in local technology expertise to seize this opportunity. This dependence

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is more than economic; it is strategic. In a world of techno-nationalism and fragmented supply chains, clean technology has become the new oil. Nations are weaponising critical minerals and tightening export controls. For India, relying on foreign hardware to fuel our green economy is a risk we cannot afford to take. That is why our green transition must be Made in India. As Prime Minister Modi has rightly emphasised, the path to Atmanirbhar Bharat and Viksit Bharat runs through Swadeshi innovation.

To achieve its clean energy objectives, India must realign its policy priorities to expand domestic manufacturing across all relevant sectors. This calls for comprehensive, well-structured interventions throughout the cleantech value chain, including incentivising private investment, expediting adoption among local manufacturers, and addressing areas with lagging progress. By adopting this approach, India can not only advance its energy transition but also enhance economic autonomy and support broader socio-economic development. The nation's strategic assets, its favourable geographic location, competitive labour costs, and rapid growth in renewable energy, provide a strong foundation for becoming a leading cleantech hub. However, realising this potential requires closing supply chain gaps and maintaining cost-competitiveness in domestic production. Developing a robust cleantech manufacturing ecosystem will rely on advanced local technology, economies of scale, reliable access to raw materials, affordable inputs, sufficient financing, and a skilled workforce. While existing policy measures and private sector initiatives have produced encouraging initial outcomes, a more integrated and large-scale effort is necessary.

The international landscape is undergoing a significant transformation. As nations have pursued "China Plus One" strategies to diversify global supply chains, India has encountered intense competition from other emerging markets in Asia, Latin America, and Africa. To differentiate itself, India should not only strengthen its own capabilities but also adopt an "India Plus Many" strategy, cultivating alliances with like-minded economies to develop diversified, secure, and resilient supply networks. Establishing strategic partnerships will improve India's competitiveness, expand market opportunities, and reinforce its position as a reliable provider in the cleantech sector. A new approach of going "Swadeshi with Partnership" may be the optimal way forward. Global alliances on finance, technology transfer, and market access should bolster our Swadeshi efforts.

Substantial policy-driven investments are currently underway, exemplified by the Production-Linked Incentive (PLI) schemes that have stimulated domestic output across critical sectors, including solar photovoltaics (PV), advanced battery storage, e-mobility, and green hydrogen. Notably, the solar PLI initiative, with an allocation of USD 3.21 billion, has facilitated integrated manufacturing spanning modules, cells, and wafers. Supplementary strategies, such as safeguard duties and manufacturing-linked auctions, have contributed to a decrease in import reliance, while annual cleantech investment reached a record high of USD 68 billion in 2023.

However, notwithstanding these initiatives, India's cleantech manufacturing sector continues to face significant challenges. There is an urgent need to promote indigenisation at competitive costs by overcoming hurdles related to infrastructure, raw materials, logistics, and associated expenses—this can be achieved through supply chain partnerships and investments in research and

development of affordable climate technologies. Financing remains a significant barrier, as high capital costs and unfavourable risk-return dynamics deter investment. Therefore, establishing long-term, innovative financing mechanisms is crucial to attract both domestic and international capital. Additionally, the sector faces a skilled workforce deficit, making it vital to enhance green skill development and improve the industry's appeal to talented professionals for roles in supply chain management and emerging cleantech domains.

Furthermore, insufficient investment in research and innovation hinders the development of affordable, locally relevant solutions, underscoring the need for targeted initiatives and collaborative approaches. Dependence on imported upstream components, technologies, and raw materials highlights the need for technology-sharing agreements and the enhancement of domestic manufacturing capabilities. Finally, limited access to advanced machinery and manufacturing technologies continues to constrain the country's production potential.

National Manufacturing Mission 2025 – including a focus on Cleantech Manufacturing

The National Manufacturing Mission, introduced in the Union Budget 2025, aims to advance India's 'Make in India' initiative by providing comprehensive policy support, strategic execution plans, and a robust governance framework to coordinate activities among central ministries and state governments. In alignment with India's climate objectives, the mission emphasises cleantech manufacturing, promoting domestic production and strengthening supply chains for critical clean energy components. These components include solar PV cells and modules, electric vehicle batteries and parts, hydrogen electrolysers, wind turbines, ultra-high voltage transmission equipment, and grid-scale batteries. This initiative aims to reduce India's reliance on imports, enhance energy security, and accelerate the country's transition to renewable energy.

The mission is structured around five principal pillars, each addressing a critical area of implementation. Its primary objective is to ease the process of doing business by optimising regulatory frameworks and offering incentives to support domestic production. The initiative seeks to develop a future-ready workforce via targeted skill development programmes and collaborative partnerships between industry and academia. Additionally, the mission aims to foster a robust and dynamic MSME sector with increased access to capital and enhanced supply chain integration. Further emphasis is placed on advancing technology through the promotion of research and development, innovation, and technology transfer. Finally, it seeks to elevate quality standards in manufacturing through recognised benchmarks and certification systems, thus enhancing global competitiveness. Collectively, these government-led initiatives underscore a strong commitment to advancing clean technology manufacturing in India.

We have the talent. We have the market. We have the urgency. Now we need clarity of direction and rapid execution. It is time to shape India's green economy with Indian climate solutions—Make in India, Solve for the World. The Government of India must expedite the unveiling of the institutional architecture of the Manufacturing Mission and get its wheels in motion.

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Development vs. Climate Transitions: Is This a False Choice?

Urvashi Prasad*

Introduction

India today stands at a crucial crossroads: a nation dedicated to lifting millions more out of poverty and inequality, while also facing an escalating climate crisis. The key question — whether economic growth and climate action can progress hand in hand or must be in conflict — has never been more pressing.

For decades, India's development has been portrayed as a race to catch up with the industrialised world, often driven by coal, steel, cement, and other carbon-heavy sectors. However, the reality of climate change shows that copying the Western growth model is neither practical nor sustainable. Likewise, halting development in the name of environmental protection is unfair when millions still lack access to reliable electricity, clean cooking fuel, nutritious food, or decent livelihoods.

This article contends that the dichotomy of "development versus climate transitions" is a **false choice**. Instead, India's future relies on integrating climate action into its growth model—through technology, finance, diplomacy, and inclusive governance. Climate action is not a hindrance to development but rather its facilitator: maintaining resilient health systems, safeguarding agriculture, and preserving the demographic dividend.

The Scale of the Challenge

India ranks as the third-largest emitter of greenhouse gases worldwide, accounting for approximately 7% of global CO emissions. However, on a per capita basis, its emissions are less than half the global average and nearly one-seventh of those in the United States. (1) This contrast illustrates India's unique challenge: it must reduce emissions while still providing development for 1.4 billion people, many of whom still lack basic amenities.

Approximately 230 million Indians still live in poverty according to multidimensional measures. (2) Nearly 40% of the workforce relies on agriculture, a sector highly vulnerable to heatwaves, erratic monsoons, and floods. (3) Public health issues - from air pollution to malnutrition - intersect with climate stresses, heightening inequalities. In this context, slowing economic growth in the name of climate action is politically and socially unacceptable.

But ignoring climate change is just as dangerous. The Intergovernmental Panel on

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Climate Change (IPCC) warns that South Asia is a regional hotspot for heat extremes, water shortages, and food insecurity. (4) A recent Lancet Countdown report estimates that heat-related deaths among older Indians have risen by 55% in the past two decades, while productivity losses caused by heat exposure cost billions each year. (5) Climate inaction, therefore, risks hindering India's development progress, damaging human capital and worsening inequality.

Linking Climate and the SDGs

The Sustainable Development Goals (SDGs) provide a perspective on the close link between climate and development. Consider:

- **SDG 1 (No Poverty):** Climate-induced crop failures and health shocks are among the leading causes driving families back into poverty in India.
- **SDG 3 (Good Health):** Increasingly, vector-borne diseases such as dengue and malaria are associated with rising temperatures and unpredictable rainfall.
- **SDG 5 (Gender Equality):** Women, especially in rural India, bear the brunt of water scarcity and fuel shortages, which are exacerbated by climate stress.
- **SDG 8 (Decent Work):** Outdoor workers, including farmers, construction labourers, and street vendors, lose working hours due to extreme heat, which directly impacts their livelihoods.
- **SDG 13 (Climate Action):** Clearly, none of the above SDGs can be achieved without incorporating climate resilience.

COVID-19 served as a sobering example of how systemic shocks — many of which are made more probable by climate change — can simultaneously reverse years of progress across the SDGs. The pandemic disrupted education, healthcare, gender equality, and livelihoods all at once. Climate disasters pose a similar cross-sectoral risk.

Public Health as a Climate-Development Nexus

India's health sector demonstrates vividly why the climate-development trade-off is illusory. Climate change increases disease burdens through heat stress, vector-borne illnesses, malnutrition, and pollution-related diseases. Already, air pollution is the second-largest risk factor for disease burden in India, linked to about 1.6 million deaths annually. (6)

Investing in clean energy and sustainable urban planning is not just "climate action" — it directly reduces hospital admissions, boosts productivity, and improves quality of life. For example, phasing out biomass cooking fuels cuts both carbon emissions and indoor air pollution, saving lives (often of women and children) while also lowering overall emissions.

Similarly, Heat Action Plans (HAPs), developed in Ahmedabad after the deadly 2010 heatwave, combine early warning systems, public awareness, and cooling centres. These measures save thousands of lives each summer while preparing cities for the increasing severity of climate risks. (7) However, most HAPs still overlook mental health impacts, gender-specific vulnerabilities, and their integration into primary

care systems. Incorporating these elements can enhance their developmental impact.

Gender and Youth Dimensions

Gender and youth perspectives strengthen the argument. Women, especially in rural India, bear a disproportionate responsibility for water collection, food preparation, and agricultural labour — all sectors heavily reliant on the climate. Studies indicate that climate shocks worsen gender-related burdens and health risks, from anaemia to maternal complications. (8)

Youth, meanwhile, are both India's strength and vulnerability. With a median age of 28, India's demographic dividend is seen as its greatest asset. However, climate change threatens to diminish it by shrinking job opportunities, encouraging migration, and exposing young people to health crises. At the same time, youth-led climate activism and innovation remain some of the most influential forces calling for change. Recognising these connections shifts the debate: safeguarding women and youth from climate risks is not just a matter of justice—it is an economic and development imperative.

Therefore, viewing the challenge as "development versus climate" is misleading. Without climate resilience, development progress collapses. Without development, climate objectives lack validity. The way forward involves integration: investing in technology, finance, and diplomacy that promote both climate action and economic growth concurrently.

If India is to demonstrate that development and climate action are not mutually exclusive, technology and innovation must be central to its strategy. Unlike the industrial revolutions of the West, which relied on fossil fuels, India has an opportunity to leap directly into a green development model. The choices it makes in energy, mobility, agriculture, and healthcare will determine whether it can achieve high growth while avoiding the worst climate impacts.

Clean Energy as the Foundation

India has set ambitious renewable energy targets — 500 GW of non-fossil fuel capacity by 2030 and net-zero emissions by 2070. These goals are supported by substantial investments: solar parks across Rajasthan and Gujarat, offshore wind projects in Tamil Nadu, and initiatives to expand green hydrogen production.

Progress is significant. India ranks as the third-largest renewable energy market globally, with solar capacity expanding nearly 30-fold over the past decade. (10) Solar tariffs are now some of the lowest worldwide, rendering renewables cost-competitive with coal. Nonetheless, renewables face challenges such as intermittency, land acquisition, and grid integration. Investment in storage (lithium-ion, pumped hydro), smart grids, and transmission corridors is essential.

Clean energy also offers significant co-benefits for development. Rooftop solar schemes, such as the Pradhan Mantri Surya Ghar Muft Bijli Yojana, aim to lower household electricity bills while reducing emissions. Decentralised solar microgrids in rural Bihar and Uttar Pradesh have energised villages that were traditionally dependent on kerosene. For women and youth, access to reliable power creates opportunities for education, entrepreneurship, and healthcare.

Mobility and Urban Futures

India's cities—already home to over 460 million people—are choking under pollution and congestion. Transportation accounts for about 13% of India's energy-related CO emissions. (11) Electric mobility is key to alleviating this burden.

The FAME II scheme (Faster Adoption and Manufacturing of Electric Vehicles) has spurred a surge in EV adoption, with sales of electric two-wheelers doubling in 2023 alone. (12) Metro rail expansions, bus electrification, and bike-sharing programmes are transforming urban mobility in cities like Delhi and Bengaluru. However, uptake remains uneven: EV adoption is concentrated in wealthier states, while charging infrastructure remains limited in rural areas.

Climate-friendly mobility also advances gender and youth equality. Women often face unsafe and unaffordable public transport, which limits their access to work and education. Incorporating electric buses and secure transit corridors into urban planning can cut emissions and help bridge gender disparities. For youth, green mobility sectors — from electric vehicle manufacturing to battery recycling — create new job opportunities, which are crucial for India's demographic advantage.

Agriculture and Food Systems

Agriculture accounts for 16-20% of India's greenhouse gas emissions, mainly from livestock, rice cultivation, and fertiliser use. (13) However, it is also one of the sectors most vulnerable, with climate change projected to reduce crop yields by up to 10-40% by 2050, depending on the scenario. (14)

Technological pathways can mitigate both emissions and vulnerabilities:

- Climate-smart seeds resistant to drought and floods are being scaled through ICAR research.
- Precision agriculture, utilising drones, IoT sensors, and AI models, helps optimise fertiliser use, thereby reducing costs and emissions.
- Solar-powered irrigation pumps not only replace the need for diesel but also allow farmers to sell surplus power back to the grid, generating an additional income stream.

These innovations need to be incorporated into nutrition-sensitive policies. Malnutrition remains a major concern, with 35% of Indian children affected by stunting and 57% of women anaemic. (15) Climate-resilient crops such as millets — promoted during India's G20 Presidency — can improve both sustainability and nutrition.

Digital Health and Climate Resilience

The healthcare sector shows how technology can support both growth and climate resilience. The Ayushman Bharat Digital Mission (ABDM) is creating interoperable health records and telemedicine platforms, already connecting millions of patients to doctors remotely.

Digital tools also enhance climate-health adaptation. Heat action plans can be integrated with telehealth, allowing vulnerable populations to consult doctors during heatwaves. Early-warning systems can connect to mobile apps for farmers and outdoor workers, offering real-time health advice. Furthermore, India's expanding health-tech startup scene leads in low-cost diagnostics, AI-powered radiology, and tele-nutrition platforms.

These efforts help reduce health inequalities and build resilience against climate shocks, which often worsen malnutrition and infectious diseases.

Innovation Ecosystems and Startups

India's innovation ecosystem is crucial to reconciling economic growth and climate change. With over 100,000 registered startups, India has become the world's third-largest hub for startups. (16) Among these, cleantech and health-tech are emerging as transformative sectors. Examples include:

- IIT Bombay's BETiC (Biomedical Engineering & Technology Innovation Centre), which incubates affordable medical devices designed for rural India.
- Agri-tech startups such as DeHaat and Ninjacart utilise AI and supply chain technology to reduce food waste and enhance farmers' incomes.
- Energy startups are pioneering affordable storage and EV charging solutions.

Public-private partnerships, challenge funds, and incubators can further accelerate these innovations, especially when connected to rural and underserved areas.

Barriers to Overcome

Despite progress, challenges remain. India's R&D expenditure constitutes only 0.7% of its GDP, compared to 2-3% in countries such as China and the United States. (17) Patent pipelines for green technologies remain limited, and the domestic manufacturing of solar panels and batteries lags behind China.

Furthermore, innovation must be inclusive. Without targeted support, women entrepreneurs, rural innovators, and marginalised youth risk being excluded from the green economy. Initiatives like the Atal Innovation Mission and Startup India need sharper equity perspectives, ensuring that climate-smart innovation is not limited to urban elite enclaves.

Technology serves as India's bridge connecting development with climate action. Renewable energy, electric mobility, climate-smart agriculture, and digital health are not only tools for cutting emissions but also promote equity, health, and livelihoods. However, expanding these innovations necessitates investment in R&D, inclusive ecosystems, and strong regulation.

India's ability to demonstrate that development and decarbonization can go hand in hand will depend on how successfully it mobilises innovation — not just in elite labs but across villages, small enterprises, and frontline systems.

Finance and Diplomacy — Mobilising Resources and Shaping Global Norms

No matter how ambitious India's policies and technologies may be, climate action cannot succeed without adequate financial support. The shift to low-carbon, climate-resilient growth requires trillions of dollars in new investments. Equally important, India's role in global diplomacy will determine whether financial flows, technology transfers, and climate governance rules are fair for the Global South.

Climate Finance — The Missing Billions

India's climate investment requirements are vast. The Council on Energy, Environment, and

Water estimates that India will need over USD 10 trillion by 2070 to reach net-zero emissions. (18) Yearly requirements amount to hundreds of billions, far outstripping current flows.

However, climate finance to India has been modest and uneven. In 2021, India received approximately USD 44 billion in green finance, which is only a third of the estimated requirement. (19) Furthermore, much of this consists of private debt, raising concerns about affordability and debt stress for developing countries. Grants and concessional finance, essential for adaptation and equity, remain scarce.

The failure of developed countries to meet their USD 100 billion annual climate finance pledge has strengthened India's call for climate justice. India contends that historically responsible nations must not only fulfil their financial commitments but also offer predictable and transparent methods to increase support.

Domestic Financial Innovations

Even as it pressures the global community, India has mobilised innovative domestic finance. Sovereign green bonds worth 16,000 crore (approximately USD 2 billion) were issued in 2023, allocated for clean transportation, renewable energy, and climate-resilient infrastructure. (20) The Reserve Bank of India has also issued guidelines on climate-related risk disclosures, signalling a shift in financial regulation.

Private finance is also contributing. Indian banks are expanding green credit lines, while blended finance structures are attracting private investment alongside concessional capital. The success of the Pradhan Mantri Ujjwala Yojana, which provided LPG connections to over 90 million households, demonstrates how public subsidies can trigger both financial and environmental benefits.

However, systemic barriers still exist. Long-term funding for renewables and adaptation initiatives remains limited. Insurance coverage is low, leaving vulnerable communities exposed to climate shocks. Increasing finance for resilience—such as heat-proofing cities, flood defences, and climate-smart agriculture—continues to be an urgent need.

Diplomacy: From Follower to Agenda-Setter

India's global climate diplomacy has evolved considerably over the past two decades. Once seen as a hesitant participant during the Kyoto Protocol era, India has now emerged as a leader on this front. Its Presidency of the G20 in 2023 emphasised climate finance, energy transitions, and sustainable development, bringing these issues to the centre of international dialogue.

One of India's most significant diplomatic achievements is the International Solar Alliance (ISA), co-founded with France in 2015. Today, ISA has over 110 member countries, offering a platform for solar deployment across the Global South. (22) Similarly, India launched the Coalition for Disaster Resilient Infrastructure (CDRI), which now includes 31 member states, providing technical and financial support for resilient infrastructure projects.

At COP28, India played a crucial role in negotiations on the loss and damage fund, emphasising that it must be new and additional finance, not repackaged development aid. These initiatives strengthen India's dual role: defending

the principle of equity while proposing cooperative platforms.

South-South Leadership

For much of the Global South, India exemplifies a credible model of balancing development with climate action. Countries in Africa, Southeast Asia, and Latin America face similar challenges: poverty reduction, energy access, and climate vulnerability. By sharing its experience in solar parks, energy access, and climate-resilient agriculture, India can establish itself as a leader in South-South cooperation.

India has already extended over USD 28 billion in development assistance to partner countries, with a significant portion allocated to Africa and South Asia, and a growing share dedicated to climate projects. (23) BRICS platforms and the New Development Bank further provide vehicles for alternative financial flows that reduce dependence on Western institutions.

Climate Finance and Gender /Youth Dimensions

Finance and diplomacy are not abstract concepts for ordinary citizens — they shape whose voices are heard and whose needs are prioritised. Women and youth are often excluded from climate finance decisions, yet they bear disproportionate burdens. For instance, during heatwaves, women agricultural workers in India experience higher health risks due to outdoor labour, while youth face disruptions to education and livelihoods.

India's climate diplomacy must therefore prioritise gender and youth in its financial narratives. Dedicated funds for gender-sensitive adaptation, such as water, health, and clean energy, could enhance equity while advancing SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities). Similarly, mobilising youth as innovators and entrepreneurs in cleantech can leverage India's demographic dividend for climate leadership.

Barriers and Risks

India's push for finance and diplomacy faces risks. Protectionist trade measures, such as the EU's Carbon Border Adjustment Mechanism (CBAM), pose a threat to Indian exporters, particularly those in the steel and cement sectors. If climate measures become tools of trade discrimination, India may find itself penalised even as it struggles to industrialise. Geopolitical tensions further complicate climate diplomacy. India must balance cooperation with developed countries on technology transfer and its roles within the BRICS and Global South blocs, ensuring it is not caught between rival geopolitical camps.

Finance and diplomacy are where India's climate-development balancing act intersects with the complex realities of power and money. Without trillions in investment, India's net-zero targets will stay aspirational. Without equity in global governance, the Global South risks being sidelined in a transition designed by and for the developed world. India's challenge — and opportunity — is to advocate for a fairer financial and diplomatic system while demonstrating credible domestic action. If successful, it can show that development pathways are not a zero-sum game, but rather that climate justice and economic growth can progress together.

Climate change is no longer just an environmental issue; it has become a public health emergency. The Lancet Countdown on Health and Climate Change (2023) reports that India is among the top five countries experiencing the highest heat-related deaths. (24) Heatwaves in 2022 and 2023 have killed hundreds and reduced outdoor labour productivity. Rising vector-borne diseases such as dengue and malaria are spreading into new regions, while floods and cyclones disrupt access to healthcare facilities.

The World Health Organisation estimates that climate change will cause an additional 250,000 deaths annually between 2030 and 2050, mainly due to malnutrition, malaria, diarrhoea, and heat stress. (25) For India, with its dense population and uneven health infrastructure, these risks are amplified. Air pollution alone — closely linked to fossil fuel use — already causes over 1.7 million premature deaths annually in India, representing a significant public health and economic burden. (26)

The public health effects of climate change are closely linked to nutrition and agriculture. Unpredictable rainfall and heat stress considerably decrease crop yields, especially of staples like wheat and rice. This endangers food security for millions and worsens malnutrition, which already impacts over one-third of Indian children under five. (27) Women and children in rural areas face disproportionate risks.

Studies indicate that maternal anaemia — affecting over 50 per cent of women of reproductive age in India — worsens due to climate-related disruptions in food and health services. (28) Digital health tools and nutrition dashboards can assist in monitoring vulnerabilities, but without climate-resilient agriculture and food systems, these risks will continue.

Gender affects both exposure to and resilience against climate change. Women are often at the frontline of providing food, water, and household energy in rural India. During droughts or floods, their burdens increase. Research by the UN Development Programme (UNDP) shows that women in India spend up to 200 hours a year collecting water, a time-consuming task that worsens under climate stress. (29) Women continue to be underrepresented in climate decision-making. Fewer than 15 percent of negotiators at UNFCCC meetings from India are women, despite their disproportionate vulnerability. (30) Gender-responsive climate policy is therefore not only an issue of equity but also a practical necessity. For instance, decentralised renewable energy projects led by women's self-help groups in states like Bihar have boosted both incomes and resilience.

Youth as Climate Stakeholders

With over 65 per cent of its population under 35, India's youth are both the most vulnerable to climate change and the most capable of fostering innovation. (31) Globally, youth movements — such as Fridays for Future — have shown the strength of civic mobilisation. In India, university-led climate incubators and startups are creating innovations ranging from affordable solar dryers to AI-powered flood prediction models.

However, structural barriers persist, including limited access to finance, a lack of green jobs in rural areas, and inadequate integration of climate issues into education curricula. India's National

Education Policy 2020 emphasises environmental awareness, but implementing this into climate literacy remains slow. (32) Empowering youth requires not just rhetoric but dedicated pathways — fellowships, seed funding, and mentorship programmes that connect young innovators to markets.

COVID-19 as a Teachable Moment

The COVID-19 pandemic clearly demonstrated the interdependence of health, environment, and economic objectives. Lockdowns temporarily reduced emissions, but progress on SDGs such as poverty alleviation, education, and gender equality was significantly rolled back. The World Bank estimates that COVID drove over 70 million people into extreme poverty worldwide.

This comparison is revealing: like pandemics, climate shocks can wipe out years of progress in just a few months. A heatwave that destroys crops or a cyclone that damages infrastructure not only impacts the environment — it also sets back SDGs on hunger, health, gender, and inequality. India's experience during the pandemic provides a warning: ignoring climate risks is not only an ecological gamble; it is a development risk.

Integrating SDGs and Climate Action

None of the 17 SDGs can be achieved without climate action. Climate change directly jeopardises SDG 2 (Zero Hunger), SDG 3 (Good Health), and SDG 6 (Clean Water and Sanitation). Conversely, progress on SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 11 (Sustainable Cities) helps to strengthen climate resilience.

India's NITI Aayog SDG Index demonstrates this connection. States that excel in clean energy and infrastructure also show progress in health and gender indicators. (34) Likewise, India's effort to improve energy efficiency under the Perform, Achieve, Trade (PAT) scheme has lowered industrial emissions while boosting competitiveness. (35) Climate action and development are not competing priorities — they are mutually reinforcing imperatives.

Conclusion

The central question — *development versus climate transition: is this a false choice?* — finds its answer in India's journey. Development without climate action is unsustainable, and climate action without development is unjust. The two are inseparable.

India faces a monumental challenge. It must lift hundreds of millions out of poverty, create more job opportunities for youth, promote gender equality, and protect public health — all while decarbonising a vast and expanding economy. Nonetheless, India also has unique strengths: a young population, a vibrant democracy, and the ability for technological innovation.

The path forward requires integration. Climate objectivelis must be incorporated into every sectoral policy, from health to trade, agriculture to urban development. Finance must support not only solar parks and electric vehicles, but also rural nutrition, women-led enterprises, and youth climate startups. Diplomacy must strengthen the voices of the Global South, while advocating for climate justice and fairness.

The pandemic demonstrated that shocks can reverse progress overnight. Climate change causes a slower yet far more profound disruption. India's story—and its leadership—will influence not just its own destiny but also that of the Global South. The choice is not between development and climate action; rather, it is whether we recognise, in time, that they are the same fight.

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Path to UN Climate COP in 2028: India's Opportunity for Global Leadership

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Abstract

India's climate journey reflects a balance between development and sustainability. Having made significant progress in renewable energy, emission intensity reduction, and global alliances like ISA, CDRI, GBA, LeadIT, and IBCA, India is emerging as a key climate leader. Despite challenges such as coal dependence, financing gaps, and rising energy demand, it continues to promote equitable climate action. Hosting COP33 in 2028 offers India a chance to amplify Global South voices and champion inclusive, just, and sustainable growth.

Prologue

2022 marks a significant milestone in India's journey as the country completed 75 years of independence, and Prime Minister Narendra Modi pledged to transform India into a developed nation by 2047[1]. Given the number of issues India had to deal with and the new mechanisms and processes it had to establish from scratch, many have considered the success of Indian democracy nothing short of a miracle. India continues to develop and lift people out of poverty, year by year, over the last 78 years. 2022 is also essential for another reason; in 2015, India set an ambitious target of deploying 175 GW of renewable energy by 2022. With the nuts and bolts of the green transition still developing, the country made an ambitious call, which, due to the active role played by all stakeholders, provided a spurt for renewable energy growth in the country. Although the country fell short of this target, implementing it showed promising progress towards a clean energy transition by deploying 119 GW of renewable energy capacity (excluding large hydro).[2] The journey set out the foundation and path for the next set of efforts on climate action and energy transition.

India's Progress on Climate Action

India is navigating a delicate path between development imperatives and climate responsibility, and in recent years, the country has registered both promising gains and persistent challenges. As of the latest assessments, India's total greenhouse gas (GHG) emissions stand at approximately 4,195 Mt CO_2-equivalent, representing ~7.6 % of global emissions.[3] While India remains among the top emitters globally, its per capita emissions are relatively low (~1.85 t CO_2e/year) compared to global averages.[4] Historically, since 1850, India's cumulative emissions amount to ~169,900 Mt

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CO_2e, contributing ~4.6 % of global historical warming.[5]

In 2023, India updated its Nationally Determined Contribution (NDC) under the UNFCCC framework, pledging to reduce the emissions intensity of GDP by 45% from 2005 levels by 2030 and aiming to have 50% of cumulative installed power capacity from non-fossil sources by 2030.[6] The government also envisions reaching net-zero emissions by 2070, and emphasises sustainable lifestyles via initiatives such as Mission LiFE (Lifestyle for the Environment).[7]

On the mitigation front, India has driven rapid growth in renewable energy capacity. By October 2025, total installed renewables (solar, wind, hydro, etc.) had reached ~242 GW, as India marches toward its 2030 target of 500 GW non-fossil capacity.[8] As of 2023, India's renewable share (including large hydro) was estimated at ~49 % of total generation capacity, with solar (~123 GW), wind (~52 GW), large hydro (~50 GW), and bioenergy (~12 GW) constituting the mix.[9] Yet when it comes to actual electricity generation, renewable energy (including large hydro) contributes only ~22 % of total generation, revealing the persistent dominance of coal in dispatch.[10] Recent capacity addition trends are robust. In fiscal year 2024–25 alone, India added 29.52 GW of renewable capacity (solar leading at ~24 GW), pushing the cumulative solar capacity past 100 GW.[11] In the first half of FY 26 (April to September 2025), India achieved a record ~25 GW of renewable additions, with solar contributing ~21.7 GW and wind ~3.09 GW.[12] These additions have enabled India to attain 50 % of its installed power capacity from non-fossil sources, five years ahead of its original 2030 timeline.[13]

The effect of these changes is visible in emission trends. India's energy-related CO_2 emissions rose sharply by 5.3 % in 2024, the highest among major economies, fueled by economic growth and increasing electricity demand.[14] However, in the first half of 2025, India's power sector CO_2 emissions declined ~1 % year-on-year, thanks to record clean energy additions, lower fossil generation, and favourable weather conditions.[15] Analysts suggest this may mark a turning point, indicating that emissions in the power sector could peak before 2030 if the trend continues.[16]

Moreover, India's climate and sectoral policies are beginning to show measurable savings: between 2015 and 2020, policies across power, transport, and residential sectors reportedly avoided ~440 Mt CO_2 emissions.[17]

According to India's Fourth Biennial Update Report (BUR-4) to the UNFCCC, submitted on 30 December 2024, India reduced the emission intensity of its GDP by 33% between 2005 and 2019, which is a significant achievement. This reduction is already more than two-thirds of India's 2030 target under its Nationally Determined Contributions (NDCs), which aims for a 45% reduction from 2005 levels[18]. The energy sector remains the most significant contributor to GHG emissions, but improvements in energy efficiency, renewable energy deployment, and policy interventions have contributed to the decline in emission intensity. India reported an increase in forest and tree cover, contributing to carbon sequestration and supporting its climate goals.

In summary, India is advancing on multiple

fronts: renewables are scaling rapidly, emissions pathways show signs of flattening in the power sector, and climate policies are generating tangible savings. Yet the path ahead is steep — success will depend on swiftly converting capacity gains into dispatchable clean power, restructuring coal reliance, mobilising finance at scale, and mainstreaming decarbonization across all sectors.

Climate Cooperation and International Coalitions

In recent years, India has spearheaded or co-hosted several international coalitions targeting climate mitigation, infrastructure resilience, industrial decarbonization, sustainable energy, and biodiversity conservation. These alliances reflect India's ambition to play a leadership role in global climate diplomacy while also aligning with national priorities. Among the most prominent functional ones are the International Solar Alliance (ISA), Coalition for Disaster Resilient Infrastructure (CDRI), Global Biofuels Alliance (GBA), Leadership Group for Industry Transition (LeadIT), and the International Big Cat Alliance (IBCA).

The International Solar Alliance (ISA) stands as the most mature of these alliances. Launched in November 2015 by India and France at the COP21 summit, ISA was conceived to bring together "sunshine countries" in a collective pursuit of scaling solar energy deployment, mobilising finance, technology aggregation, capacity building, and lowering costs of solar power [19]. Over time, its membership has expanded: more than 100 countries have signed the ISA Framework Agreement, with 90+ having ratified it as full members.[20] The ISA has operationalised its Global Solar Facility (GSF) pilot projects and continues to work on de-risking solar investments, particularly in the Global South.[21]

Complementing mitigation efforts with resilience goals, the Coalition for Disaster Resilient Infrastructure (CDRI) was launched in September 2019 by India at the UN Climate Action Summit. The aim is to foster infrastructure systems that can withstand climate and disaster risks, thereby reducing economic losses and promoting sustainable development outcomes. As of now, CDRI comprises around 60 members (50 countries and 10 institutional members) and supports more than 180 projects, with a secretariat based in New Delhi. Its work includes technical standards, risk mapping, capacity building, policy dialogue, and project support in member countries.

On the clean energy front, the Global Biofuels Alliance (GBA) was launched in September 2023 on the sidelines of the G20 Summit in New Delhi, championed by India along with nations such as the United States, Brazil, Italy, Argentina, and others.[22] GBA's objective is to coordinate international efforts to scale sustainable biofuels, facilitate trade, assist national biofuel programs, and align standards and policies.[23] As of mid-2025, new countries like Namibia have joined the alliance, illustrating its expanding reach in the Global South.[24]

To promote decarbonisation of heavy industry, the Leadership Group for Industry Transition (LeadIT) was co-launched by India and Sweden in 2019 at the UN Secretary-General's Climate Action Summit. The alliance unites governments, industry leaders, and financiers to accelerate pathways for low-carbon heavy industries, especially steel, cement, and chemicals. In

December 2023 at COP28, LeadIT entered a new phase—LeadIT 2.0—launching the India-Sweden Industry Transition Platform and enhancing partnerships and policy frameworks for industrial transition. India and Sweden serve as co-chairs, hosting annual summits and expanding global coordination for industry decarbonisation.

In the domain of biodiversity and conservation, India launched the International Big Cat Alliance (IBCA) in April 2023 during the 50th anniversary of Project Tiger, with the vision to coordinate global conservation efforts across seven "big cat" species: tiger, lion, leopard, snow leopard, cheetah, jaguar, and puma.[25] The Cabinet approved the establishment of IBCA in March 2024. In April 2025, India and the IBCA signed a Headquarters Agreement that locates its secretariat in India and provides legal and institutional support.[26] As of 2025, IBCA has become an intergovernmental organisation, with over 12 countries formally joining. A first assembly was held in New Delhi, during which leadership structures, work plans, and rules of procedure were adopted.[27] The IBCA also contributes to climate adaptation, ecosystem resilience, and biodiversity goals by safeguarding habitat integrity, reducing wildlife trade, and promoting collaborative conservation.[28]

Together, these alliances represent a multi-pronged approach by India: leveraging solar power and biofuels for mitigation; embedding resilience in infrastructure; decarbonising industrial sectors; and protecting biodiversity and ecosystems. While each operates in a distinct domain, there is scope for synergy among them—for example, green infrastructure investments that integrate solar and resilience, or industrial decarbonization that supports sustainable biofuel markets. The real test now lies in translating alliance frameworks and diplomatic momentum into impactful projects on the ground across member countries, ensuring sustained funding, institutional capacity and cross-sectoral integration.

Challenges towards climate action, biodiversity and conservation

India's climate transition is at a critical juncture — it has achieved substantial momentum in renewable energy and global climate alliances, but structural constraints continue to anchor its carbon trajectory. India has positioned itself as a global leader in climate diplomacy — committing to reduce the emissions intensity of its GDP by 45% from 2005 levels by 2030, achieving its target of 50% of installed electricity capacity from non-fossil sources well ahead of schedule, and aiming to reach net-zero by 2070.[29] Yet, translating these commitments into sustained emission reductions remains a challenging task due to the following reasons:

1. Dependence on Coal and Fossil Fuels

The single most significant challenge to India's decarbonization lies in its continued dependence on coal. Coal accounts for nearly 73% of India's electricity generation and around 44% of total primary energy supply.[30] Although the share of renewables in installed capacity has surpassed 49%, the actual generation share of clean power remains just ~22% due to intermittency and baseload limitations[31], reflecting a continuing reliance on coal for energy security and industrial growth.[32] The entrenched role of coal in employment, regional economies (especially in

Jharkhand, Chhattisgarh, and Odisha), and power sector finance makes a "just transition" complex. Closing or repurposing coal plants without robust social protection frameworks risks political and social backlash.

2 Rising Energy Demand and Developmental Pressures

India's economy is growing rapidly, with energy demand projected to double between 2020 and 2040.[33] Industrialisation, urbanisation, and increasing per capita income have led to surging demand for electricity, steel, cement, transport fuels, and air conditioning — all highly carbon-intensive sectors. The residential cooling sector alone saw a 292% increase in emissions from 2000 to 2022.[34] Unlike mature economies, India must expand quality energy access and industrial capacity while decarbonising — a dual challenge that places immense strain on public finances and technological readiness.

3 Financing and Investment Gaps

India's transition requires an estimated USD 10 trillion between 2020 and 2070 to achieve net-zero emissions. More immediately, Deloitte (2024) estimates India will need USD 1.5 trillion by 2030 for investments in renewable energy, electric mobility, hydrogen, and carbon capture.[35] However, climate finance flows into India are less than one-tenth of the required level — around USD 44 billion annually versus the needed USD 260 billion.[36] Barriers include limited concessional finance, currency risks for foreign investors, and the absence of a robust domestic carbon market.

4 Technological and Infrastructure Constraints

India's transition to clean energy depends on large-scale deployment of technologies such as battery storage, green hydrogen, smart grids, and carbon capture, utilisation and storage (CCUS) — most of which are either expensive or at nascent stages. Grid integration remains a major bottleneck: the addition of transmission capacity is lagging behind renewable growth, leading to the curtailment of solar and wind power in some states.[37] Moreover, manufacturing localisation for solar modules, wind turbines, and EV batteries remains limited despite production-linked incentive (PLI) schemes. India imported over USD 12 billion worth of solar cells and modules in FY2024, raising concerns about technological dependence.[38]

5 Industrial and Transport Sector Emissions

The industrial sector accounts for approximately 28% of India's total GHG emissions, with steel and cement alone contributing nearly half of the industrial CO.[39] Decarbonising these sectors is challenging due to process emissions, high energy use, and a lack of commercially available low-carbon alternatives. Similarly, transport emissions are increasing rapidly: vehicle ownership is expected to triple by 2040, and the share of electric vehicles remains below 5%.[40] Despite government programs such as FAME-II and ethanol blending targets, infrastructure and affordability barriers persist.

6 Agricultural and Land-Use Emissions

Agriculture contributes around 18% of India's GHG emissions, mainly from methane (paddy

cultivation, livestock) and nitrous oxide (fertiliser use).[41] Unlike energy, these emissions are diffuse and harder to mitigate. Electrification of irrigation, improved fertiliser efficiency, and sustainable livestock practices remain underfunded. In parallel, forest carbon sinks are under stress due to land-use change, deforestation, and climate-driven productivity declines. Recent studies show a 6.2% reduction in forest productivity despite greening trends.[42]

7 **Institutional and Governance Challenges**
While India has a robust policy framework — including the National Action Plan on Climate Change (NAPCC), State Action Plans (SAPCCs), and sectoral missions — coordination, data transparency, and implementation capacity remain weak. Climate budgeting and adaptation planning vary significantly across states. Moreover, local governments often lack the technical expertise to integrate climate considerations into urban and infrastructure planning.[43]

8. **Adaptation and Climate Resilience Gaps**
India is one of the world's most climate-vulnerable countries. It faces frequent heatwaves, floods, glacial melt, and erratic monsoons, all of which are intensifying due to global warming. The economic losses from climate disasters are estimated at USD 87 billion annually, disproportionately affecting poor and coastal communities.[44] While adaptation initiatives like the Coalition for Disaster Resilient Infrastructure (CDRI) and city-level Climate Action Plans (e.g., Mumbai, Surat) are essential, overall adaptation finance remains below 15% of total climate spending.[45]

COP 33 – an opportunity for India to amplify emerging economies' voice, exchange learnings and showcase India's progress

India has shown willingness to host COP 33 in 2028, which would be an incredible opportunity to showcase India's progress, exchange learnings and act as a voice of emerging economies on various issues. Following India's curve, countries around the world need to solve multiple developmental problems and expand their economies, while ensuring no harm to their environment and ecology. While there are still existing challenges and further scope for improvements in many areas, India has made significant strides on the climate front while simultaneously expanding as an economy and ensuring the development of the vulnerable and low-income groups. For example, on the energy front, this includes a massive expansion of the grid and ensuring almost universal access to electricity to households through the Saubhagya scheme.[46] Through Pradhan Mantri Ujjwala Yojana (PMUY), the country has transformed millions of households by providing deposit-free LPG connections to adult women from poor households. This initiative promotes health through better air quality, environmental sustainability, and women's empowerment by replacing cooking fuels like firewood and cow-dung cakes.[47]

On the renewable energy end, India has made exponential progress, and its solar power sector has witnessed an extraordinary 3450% increase in capacity over the past decade, rising from 2.82 GW in 2014 to 100 GW in 2025.[48] Recently, a solar plus storage project in Morena, Madhya Pradesh, got a record-breaking tariff of 2.70/kWh (around

US¢3). This was the first time in India that a tariff below 3/kWh has been achieved for a firm dispatchable renewable energy (FDRE) project. Through PM Suryaghar Yojana, India has added 6 GW of rooftop capacity across 2 million households in just 1.5 years. Given the scale and similar development context, India can share a lot on policy and regulatory design, bidding and procurement process, etc., with other emerging economies.

India also must utilise its prospective COP presidency to champion equitable climate finance by reinforcing the principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC), ensuring that Global South countries receive sufficient resources for adaptation and mitigation. As a bridge between developed and developing nations, India can leverage its leadership in alliances like the International Solar Alliance, CDRI, and Global Biofuels Alliance to advocate for enhanced concessional finance, technology transfer, and debt relief mechanisms. By campaigning for fair access to green capital and showcasing scalable low-cost climate solutions, India can strengthen South-South cooperation and help align global financing architecture with the developmental needs of emerging economies.

It will be important for India to emphasise that development itself is the first line of defence against climate calamities and a key tool for resilience and adaptation for vulnerable communities, especially for countries currently at the lower end of the development spectrum. India can utilise the COP opportunity to voice the global south's perspective on climate action to ensure that international efforts are fair – through adequate flow of finance from developed to developing countries, giving proper importance to resilience and adaptation in climate discussions, and ensuring no one is left behind in this transition.

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Global Commitments, Local Realities: India's Climate Finance Journey

Abhishek Saxena*

Abstract

India's climate transition financing presents a complex landscape where global climate finance mechanisms intersect with domestic innovation needs, especially in the electric vehicle (EV) sector. This article examines the dual challenges India faces in securing sufficient international climate finance while simultaneously developing strong domestic mechanisms to achieve its goal of net-zero emissions by 2070. Through analysis of India's stance on the New Collective Quantified Goal (NCQG) and emerging challenges in EV financing, this article highlights notable gaps between global climate finance commitments and local implementation realities. The research shows that while India rejected the NCQG's $300 billion target as insufficient against its $1.5-2.5 trillion climate financing needs by 2030, domestic innovations in EV financing are hampered by structural barriers such as high interest rates (>20% versus 10% for Internal Combustion Engine vehicles), uncertain residual values, and limited institutional support. The article suggests that India's success in climate transition financing hinges on reforming global mechanisms and fostering local innovations, including government-backed EV financing institutions, battery-as-a-service models, and integration with climate finance taxonomies.

Introduction

India's approach to financing the climate transition reflects a core tension between global ambitions and local realities, most visibly at the intersection of international climate finance negotiations and domestic challenges to the adoption of electric vehicles (EVs).[1]

As the world's most populous nation and the third-largest greenhouse gas emitter, India simultaneously advocates for increased climate finance from developed countries while also taking a leadership position in its domestic climate action, thereby requiring innovative domestic financing mechanisms[2]. The scale of India's financing challenge is unprecedented. Current assessments suggest India requires between $1.5 trillion and $2.5 trillion by 2030 to meet its climate targets and support its transition to net-zero emissions by 2070[3]. This massive capital requirement, which is equivalent to roughly 1.3% of India's GDP annually,

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must be mobilised through a complex ecosystem of global and local financial mechanisms, each with distinct characteristics, constraints, and opportunitiest[4].

Recent developments have intensified focus on this dual challenge. India's rejection of the New Collective Quantified Goal (NCQG) at COP29 as "a paltry sum" crystallised persistent tensions between the needs of the Global South and commitments by the Global North[5]. Simultaneously, India's domestic EV sector, despite selling over 1.5 million units in FY2024, faces acute financing challenges that threaten to make it difficult for people to access affordable transportation in an increasingly electrified mobility landscape[6].

The EV financing crisis illuminates broader patterns in climate transition financing. While global climate finance mechanisms emphasise market-driven mobilisation and private sector engagement, ground-level realities reveal structural barriers that hinder equitable access to climate solutions[7]. EV buyers face interest rates exceeding nearly 20%, compared to almost 10% for Internal Combustion Engine (ICE) vehicles. Uncertain residual values and limited institutional support create additional barriers, particularly for vulnerable populations[8].

This article argues that India's climate transition financing challenges cannot be understood in isolation but must be analysed as interconnected dimensions of a broader transformation in global environmental governance. The global dimension reveals that international climate finance mechanisms, despite recent increases, remain inadequate and structurally biased towards solutions that may not serve the priorities of developing countries. The local dimension highlights how domestic innovations encounter institutional and market barriers that necessitate coordinated policy interventions to achieve scale and equity.

The Global Dimension: India and the NCQG

Climate Finance Before NCQG: A System of Loans Disguised as Support

The climate finance architecture that preceded the NCQG was fundamentally flawed in its delivery mechanisms and composition, creating what economists term "debt traps" for the very countries it purported to help[9]. According to the Centre for Science & Environment (CSE) analysis, between 2011 and 2020, a mere 5% of climate finance was provided as grants, while 61% was disbursed as loans and 34% as equity financing. This heavily loan-based approach meant that climate finance, rather than providing relief for climate impacts that developing countries did not cause, actually added to their debt burdens. The limited concessional finance available (grants and low-cost debt constituted only 16% of total climate finance) during this decade led to a vast majority of international climate finance being market-rate loans that required full repayment with interest.

The debt trap arises from the intersection of high climate finance needs and predominantly loan-based delivery mechanisms, which is particularly acute for climate-vulnerable nations. CSE's analysis reveals that about 30% of low- and middle-income countries face higher annual debt servicing costs than what it would cost to achieve their entire Nationally Determined Contributions (NDCs). For instance, countries like Ghana face $3.23 billion in annual debt service while needing only $0.93 billion

annually to meet their climate goals. This creates a perverse situation where countries must choose between servicing existing debt or investing in climate action, often trapped in a cycle where climate inaction leads to greater climate-related damages, which further weaken their fiscal position and increase borrowing costs.

Multilateral Development Banks (MDBs), despite being significant sources of climate finance, have perpetuated the debt trap through their lending practices. Between 2010 and 2020, MDBs provided an average of only 20% of their climate finance as grants, with 79% coming as loans[9]. The World Bank, for example, provided 30% of its total operations as climate finance in 2021, but predominantly through debt-creating instruments. This approach is particularly problematic because MDBs hold 22% of the debt of emerging market economies, yet they do not participate in debt relief efforts.

The pre-NCQG climate finance system came with conditionalities that constrained the policy sovereignty of developing countries while adding to their debt burdens[9]. The emphasis on mobilising private sector finance rather than providing direct public support meant that climate finance flows were concentrated in commercially viable projects in middle-income countries. In contrast, the most vulnerable nations, particularly Least Developed Countries and Small Island Developing States, received disproportionately limited support. This market-oriented approach failed to address the fundamental justice dimension of climate finance: that developing countries, having contributed minimally to historical emissions, should receive support as a matter of equity rather than commercial viability, not loans that worsen their fiscal constraints and limit their capacity for future climate action. 2.2 The NCQG Framework and Its Limitations

The New Collective Quantified Goal (NCQG) on climate finance represents the most significant recalibration of international climate commitments since the Paris Agreement. Yet, its architecture reveals fundamental tensions between developed and developing country perspectives on climate justice[10]. Established at COP29 in Baku with a baseline target of $300 billion annually by 2035, the NCQG was designed to address the acknowledged failure of the $100 billion commitment while scaling up to meet the unprecedented financing needs of developing countries.

The quantitative dimensions of the NCQG, while representing a threefold increase from previous commitments, fall dramatically short of assessed needs. Multiple studies have placed annual developing country climate finance requirements at $1.1-1.8 trillion per year till 2030[11]. The emphasis on mobilising finance from diverse sources, including private sector investment, multilateral development bank lending, and innovative financing instruments, raises concerns about the commitments of governments and their obligation to meet climate finance targets[12].

India's comprehensive rejection of the NCQG at COP29 represented more than diplomatic dissent; it articulated a sophisticated critique of contemporary approaches to international environmental governance[13]. Speaking on behalf of the Like-Minded Developing Countries (LMDCs), India's intervention highlighted both substantive and procedural objections that also illuminate broader questions about democratic

legitimacy in climate negotiations. Substantively, India challenged the fundamental framing of the NCQG as inadequate in quantum, inappropriate in composition, and problematic in timeline. The $300 billion target, while numerically significant, represents what India termed "a paltry sum" when assessed against the scale of climate impacts already affecting developing countries and the accelerating costs of delayed action. The 2035 timeline, moreover, effectively defers substantial scaling up of climate finance for more than a decade while developing countries face immediate adaptation needs and escalating loss and damage costs.

The Local Dimension: EV Financing Challenges in India

India's electric mobility transformation presents a compelling case study of how global climate objectives intersect with local financing realities, creating both opportunities and barriers for sustainable development[14]. With over 1.5 million electric vehicles sold in FY2024 and projections suggesting EVs will account for 30% of all new vehicle sales by 2030, India's EV market represents one of the world's fastest-growing sustainable transport transitions.

The fundamental challenge stems from the cost economics of EVs compared to Internal Combustion Engine (ICE) vehicles, which create affordability barriers that disproportionately affect vulnerable populations[15]. The upfront cost of an EV typically ranges from 1.5 to 2 times that of an equivalent ICE vehicle, while operating costs are only 10-20% of ICE vehicle costs. This cost structure makes economic sense for high-usage commercial vehicles but creates significant barriers for private vehicles used sparingly by students, rural populations, and low-income urban residents.

The financing landscape exacerbates these challenges through structural biases that penalise EV adoption among vulnerable populations. Interest rates for EV loans typically exceed 20%, nearly double the rates available for ICE vehicle financing. This disparity reflects multiple factors, including perceived technology risks, uncertain residual values, and limited institutional familiarity with EV financing models. For populations that save for months to purchase a two-wheeler or dedicate substantial portions of their monthly income to vehicle loan repayment, these higher costs create insurmountable barriers.

The institutional architecture of vehicle financing in India compounds these challenges. Traditional public sector banks, including State Bank of India, have historically avoided the two-wheeler and three-wheeler financing market, creating space for specialised Non-Banking Financial Companies (NBFCs) such as Bajaj Finance and Mahindra Finance[16]. However, these NBFCs have been slow to enter the EV financing space due to technology risks, uncertain asset values, and higher capital costs. The result is a financing gap that threatens to exclude millions of potential EV users, particularly in Tier II and Tier III cities, where formal financial penetration remains limited.

The Intersection of Global and Local: Lessons from India's Experience

How Global Climate Finance Gaps Affect Local Implementation

The disconnect between global climate finance commitments and local implementation realities is perhaps nowhere more evident than in India's EV transition, where international funding mechanisms designed to support sustainable transport often fail to address the specific barriers that prevent equitable access to electric mobility[17]. This misalignment reflects broader structural issues in international climate finance, which prioritise scalable, commercially viable investments over equity and inclusion as primary objectives.

International climate finance for electric mobility in India, while substantial in absolute terms, reveals several patterns that illuminate broader challenges in global climate governance. The $3 billion mobilised by multilateral institutions for India's ZEV transition represents significant resources; however, the predominance of loan-based instruments creates debt burdens that may be inappropriate for addressing what are fundamentally global public goods[18]. When EV financing carries interest rates exceeding 20% due to perceived risks and limited institutional familiarity, international climate finance mechanisms that rely on market-based cost recovery may exacerbate accessibility barriers.

Case Study: The World Bank-SIDBI EV Financing Program - A Lesson in Implementation Failures

The World Bank-SIDBI Electric Vehicle Risk Sharing Program represents a compelling case study of how well-intentioned global climate finance initiatives can encounter significant implementation challenges when they fail to address local market realities and institutional constraints[19] adequately. Announced in 2021 with considerable fanfare, this program was designed to establish a $300 million "first loss risk sharing instrument" that would ultimately mobilise $1.5 billion in EV financing, demonstrating how international climate finance could catalyse domestic lending for sustainable transportation.

The program's initial design reflected a sophisticated understanding of EV financing barriers, proposing to reduce interest rates from the prevailing 20-25% to 10-12% through a partial credit guarantee mechanism. Under NITI Aayog's guidance as the facilitating agency, the initiative aimed to address the fundamental constraint that prevented mainstream financial institutions from entering the EV financing market: the perception of excessive risk due to unproven technology, uncertain residual values, and limited operational experience.

However, the program's trajectory illustrates how global climate finance mechanisms can struggle with ground-level implementation challenges. The State Bank of India (SBI), originally designated as the program manager, withdrew after conducting due diligence that revealed concerns about the non-viability of this instrument. This withdrawal reflected broader institutional hesitancy among traditional banks in financing two-wheelers and three-wheelers, partially due to losses suffered from financing e-rickshaws powered by unreliable lead-acid batteries.

NITI Aayog's response to these setbacks demonstrates both the opportunities and limitations of policy coordination in complex financing ecosystems. The institution pivoted from SBI to

SIDBI as the implementing agency, recognising that a development finance institution with expertise in MSMEs might be better positioned to navigate the specific challenges of EV financing. This decision reflected NITI Aayog's sophisticated understanding that successful climate finance requires institutional intermediaries with appropriate risk appetite and sectoral knowledge.

Yet the broader program's failure to achieve its original scale and timeline highlights structural limitations in how international climate finance engages with domestic institutional realities. Three years after its announcement, the promised fund has not materialised, and interest rates for EV financing remain in the 20-25% range that the program was designed to address. This outcome reflects not institutional incompetence but rather the complexity of addressing market failures that extend beyond pure financial intervention to encompass technology maturity, regulatory frameworks, and ecosystem development.

Local Innovations as Models for Global Reform

India's domestic innovations in climate finance and EV financing provide important models that could inform broader reforms in international climate finance mechanisms[20]. The country's draft Climate Finance Taxonomy, developed by the Ministry of Finance, demonstrates how comprehensive frameworks can support both international and domestic climate investments while maintaining attention to equity and development objectives.

The taxonomy's emphasis on "country-determined transition pathways" offers an alternative to climate finance driven by the global north, with conditions that often overlook ground-level realities. By establishing clear criteria for climate-relevant activities while maintaining flexibility to accommodate India's diverse economic structure and development priorities, the framework demonstrates how technical standards can support rather than constrain climate action in India.

India's approach to addressing EV financing challenges through proposed government-backed institutions offers insights relevant to international climate finance reform. The recommendations by various stakeholders for an EV-focused financing institution, modelled on successful examples like the Small Industries Development Bank of India (SIDBI) and the National Bank for Agriculture and Rural Development (NABARD), demonstrate how public institutions can address market failures while catalysing private sector engagement[21].

Battery-as-a-Service models and other innovations that decouple high upfront costs from ongoing operational expenses offer insights for international climate finance design. By reducing initial capital requirements, these models address one of the most significant barriers to climate technology adoption among vulnerable populations[22]. Global climate finance mechanisms could incorporate similar approaches, providing patient capital for high upfront costs while enabling market-based recovery of operational expenses.

Persistent Challenges and Structural Barriers

The fundamental challenge facing India's climate transition financing remains the stark mismatch between assessed needs and available

resources across all dimensions and scales. At the global level, even if the NCQG's $300 billion annual target were fully achieved and distributed equitably among developing countries, India's share would represent only a fraction of its estimated $1.5-2.5 trillion financing needs through 2030[23]. This quantitative gap underscores the limitations of the current international climate finance architecture and the continued dependence on domestic resource mobilisation.

The EV sector illustrates how these constraints operate at the level of specific technologies and markets. Despite the remarkable growth in EV financing, expected to reach $19.9 billion by 2030, this amount remains insufficient to support the complete transformation of India's transport sector, which includes over 200 million vehicles and requires an estimated $60 billion investment by 2030[24]. The gap is particularly acute for adaptation and resilience investments in transport infrastructure, which receive minimal attention from both international and domestic climate finance mechanisms.

Institutional capacity constraints further compound scale challenges. While India has developed sophisticated frameworks such as the draft Climate Finance Taxonomy, effective implementation requires capacity building across hundreds of financial institutions, thousands of project developers, and millions of potential beneficiaries[25]. The specialised knowledge needed for climate finance assessment, monitoring, and verification creates bottlenecks that may constrain scaling up even when financial resources are available.

Policy Recommendations: Bridging Global and Local Finance

Reforming Global Climate Finance Architecture

India's experience with both the NCQG negotiations and domestic EV financing challenges provides essential insights for reforming international climate finance to serve the needs of developing countries better and ensure equitable access to climate solutions. In this context, international climate finance mechanisms must shift from mobilisation frameworks that emphasise private sector engagement towards obligations that acknowledge developed countries' historical responsibility for climate change. This should be in the form of grant capital, mainly, thus reducing the cost of accessing finance and alleviating the fear of a debt trap in India and other economies in the Global South[26].

This shift would entail several concrete changes in the design of international climate finance. Grant-based and highly concessional financing should be prioritised for adaptation, loss and damage, and technology access that serves public goods functions rather than generating commercial returns. The governance structures of international climate funds should be reformed to ensure meaningful representation of developing countries in decision-making, with particular attention to the voices of climate-vulnerable populations.

The integration of climate finance with broader development objectives requires explicit attention in international mechanisms. Rather than treating climate action as an isolated intervention, international climate finance should support integrated approaches that address climate,

development, and equity objectives simultaneously. India's Climate Finance Taxonomy provides a model for how such integration can be operationalised through technical frameworks that maintain rigour while ensuring flexibility.

Scaling up Domestic Climate Finance Innovation in the EV Sector

The domestic dimension of India's climate finance challenges requires coordinated policy interventions that can address market failures while ensuring equitable access to climate solutions. The establishment of a government-backed EV financing institution should be prioritised as a model for broader institutional development in climate finance[21].

Such an institution could provide refinancing facilities to NBFCs and microfinance institutions, thereby reducing their cost of capital and enabling more accessible terms for end-users. Initial capitalisation could combine government resources with international climate finance, including funds from the Green Climate Fund and other multilateral mechanisms. This approach demonstrates how global and domestic resources can be effectively combined to address specific market failures while maintaining local ownership and control.

Battery-as-a-Service models and other innovations that reduce upfront costs should be supported through targeted policy interventions. This could include risk-sharing mechanisms that facilitate private sector concerns about technology obsolescence, regulatory frameworks that enable new business models, and integration with broader digital infrastructure initiatives. The proposed Battery Aadhar system, which would track individual battery performance and enable transparent valuations, represents the kind of institutional innovation that could transform EV financing by reducing uncertainty and improving asset quality.

Conclusion: Toward Equitable Climate Transition Financing

India's experience with climate transition financing reveals both the possibilities and limitations of current approaches to mobilising resources for sustainable development in the context of urgent climate action needs. The country's rejection of the NCQG and its struggles with EV financing highlight issues of aligning global climate finance mechanisms with local development priorities and ensuring that climate solutions are accessible to all populations[27].

The analysis demonstrates that adequate climate transition financing requires addressing both global and regional dimensions simultaneously. International climate finance mechanisms, despite recent increases in commitments, remain inadequate in scale and inappropriate in design for addressing the equity dimensions of climate action. The emphasis on market-driven mobilisation and private sector engagement, while potentially expanding resource volumes, may exacerbate inequalities if not carefully designed to ensure accessibility and affordability.

The World Bank-SIDBI case study illustrates how even well-designed international climate finance programs can struggle with implementation when they encounter institutional constraints and market realities that were not adequately anticipated during program design. The program's shift from SBI to SIDBI demonstrates the

importance of adaptive management and institutional learning in climate finance delivery. However, India's innovations in domestic climate finance provide essential models for addressing these challenges. The Climate Finance Taxonomy demonstrates how technical frameworks can maintain rigour while ensuring flexibility and country ownership. Proposed innovations in EV financing, including government-backed institutions and Battery-as-a-Service models, offer pathways for addressing market failures while maintaining development objectives.

The path forward requires continued collaboration between global and local actors, sustained innovation in financial instruments and delivery mechanisms, and unwavering commitment to ensuring that climate finance serves both environmental and development objectives. India's leadership in these areas, from its principled advocacy in international forums to its institutional innovations in domestic markets, positions the country to influence fundamentally how the world approaches climate finance in the critical decade ahead[28].

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Climate Cooperation Principles for the Indian Ocean Region (IOR) Countries

Shashvat Singh*

The Indian Ocean, the world's third-largest after the Pacific and Atlantic, extends about 9,600 km from the Bay of Bengal to the Antarctic and around 7,800 km from South Africa to Western Australia. Covering an area of 21.45 million square nautical miles (approximately 20 per cent of the Earth's water surface), it features a coastline of nearly 70,000 km. The Indian Ocean Region (IOR) comprises 36 countries and has a population of approximately 2.5 billion, accounting for 35 per cent of the global population and 40 per cent of the world's coastline.[1]

The IOR is central to global trade, with nearly 100,000 ships navigating its waters annually. It accounts for approximately 30 per cent of worldwide container traffic and transports 42 per cent of crude oil, petroleum products, and distillates globally. The region possesses more than half of the world's proven oil and gas reserves. It hosts approximately 20 per cent of global refining capacity, concentrated in hubs such as Jubail (Saudi Arabia), Jamnagar (India), and Singapore. Offshore exploration and production are extensive, with operations off the coasts of India, Iran, Saudi Arabia, and other Gulf Cooperation Council nations, as well as Western Australia, collectively contributing 40 per cent of global offshore output.[2]

The IOR is also home to some of the busiest and most strategic ports, including Singapore, which alone handles nearly one-seventh of global container transshipment. Among the world's 20 largest merchant fleets, three (India, Malaysia, and Singapore) belong to Indian Ocean littoral states. The northern Indian Ocean hosts the busiest sea lane of the global east-west trade corridor, cementing its status as one of the world's most critical maritime and geostrategic arteries.[3]

Therefore, securing the safety and stability of its shipping lanes and trade routes, primarily through chokepoints like the Straits of Hormuz, Bab el-Mandeb, and Malacca, is of global importance, extending well beyond regional concerns.[4]

However, beyond its economic and strategic significance, the IOR faces a rapidly deteriorating environmental and climate crisis with significant geopolitical and geoeconomic consequences. The Indian Ocean is warming at a faster rate than any other ocean, leading to increased sea level rise and exacerbating extreme weather events.[5] The increasing population, concerning pollution,

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ecological decline, and the cumulative effects of climate change, are increasingly shaping the futures of Indian Ocean states. These shared issues jeopardise the region's environmental stability and future prosperity, highlighting the urgent need for united action and innovative solutions.

Climate Crisis in the IOR and Unfolding Geopolitical Saga in a Warming Ocean

The Indian Ocean is expected to warm by between 1.7°C and 3.8°C at a faster rate than previously predicted. In fact, sea surface temperatures in the IOR have already increased by over 1.5°C since the Industrial Era.[6] Without rapid reductions in greenhouse gases, such as carbon dioxide and methane, this warming trend is likely to continue at an accelerated pace throughout the century. Changes in the Asian monsoon system, shifting rainfall patterns, and disturbances to marine ecosystems are among the primary risks associated with climate change in the IOR.[7]

Other vulnerabilities include the increasing frequency and severity of tropical cyclones, flooding of low-lying coastal regions, shoreline erosion, saltwater intrusion, and the deterioration of coral reefs and fisheries due to ocean acidification. Collectively, these impacts pose serious threats to livelihoods as well as the food and health security of millions.[8]

Sea-level rise poses a significant threat to the very existence of low-lying island nations, such as the Maldives and Mauritius. At the same time, agriculture and freshwater supplies in many IOR states face mounting pressure from erosion and salinity. These climate stresses are already causing displacement and migration as communities lose their homes and incomes.[9]

A survey involving 24,000 internal migrants across Bangladesh, India, Indonesia, Nepal, and the Philippines reveals concerning patterns. Nine out of ten respondents reported experiencing extreme weather events, with heat identified as the greatest threat to livelihoods and household well-being in nearly every country. Extensive wage losses, severe health impacts, increasing food insecurity, rising medical costs, and inadequate housing further compound the hardships faced by these communities.[10]

Climate change also risks heightening existing geopolitical tensions caused by population displacement and competition over fisheries and seabed minerals. Countries are increasingly investing in deep-sea exploration and sustainable resource management to protect their economic interests.[11] Fishing disputes arising from boundary infringements and illegal, unreported, and unregulated (IUU) fishing are likely to escalate as fish stocks decline or shift due to changes in ocean conditions.[12] Countries like Sri Lanka are strengthening maritime security and coastal resilience to tackle issues such as illegal fishing and population displacement.[13] On the economic front, climate-related disasters threaten vital infrastructure, including ports, energy facilities, and coastal telecommunications, resulting in cascading effects on trade, supply chains, and national economies.[14]

Compounding these challenges, many IOR countries remain ill-equipped to adapt to global carbon market mechanisms, such as the European Union (EU)'s Carbon Border Adjustment Mechanism (CBAM). This introduces new structural, institutional, and financial obstacles for regional economies. Furthermore, land loss caused by rising seas and coastal erosion could complicate maritime governance by undermining existing boundaries and Exclusive Economic Zones (EEZs), within which states exercise jurisdiction over their resources.[15]

Protecting critical coastal infrastructure will require substantial investments in resilience and adaptation, supported by regional and global cooperation. Meanwhile, climate vulnerabilities could escalate geopolitical tensions, with major powers using climate initiatives to extend influence in vulnerable nations. For example, under the China–IOR Forum on Development Cooperation, Beijing has proposed launching a Disaster Prevention and Mitigation Alliance and an Early Warning System (EWS), while also increasing renewable energy investments in countries such as the Maldives and Bangladesh.[16] Recognising the magnitude of the challenge and to counter the growing influence of rival powers in the IOR, India's Defence Minister has highlighted the need for a strong naval presence.[17]

Role of India

As a key regional player, India is spearheading climate diplomacy efforts, encouraging cooperation to protect shared resources and ensure a stable, sustainable future. Its Security and Growth for All in the Region (SAGAR) vision highlights climate resilience, ocean governance, and disaster preparedness, aiming to enhance the abilities of littoral states while promoting sustainable development and deeper regional integration.[18] India is working to strengthen clean energy partnerships with its IOR neighbours, including Sri Lanka and Mauritius.[19] Its Deep Ocean Mission aims to explore and sustainably utilise ocean resources.[2020] Baruah, D. M., Labh. N., Greely, J. (2023). Mapping the Indian Ocean Region. Carnegie Endowment for International Peace

The country has played a vital role in establishing multilateral platforms such as the International Solar Alliance to promote the solar sector, the Coalition for Disaster Resilient Infrastructure to enhance disaster resilience, the International Big Cat Alliance to support big cat conservation, and the Global Biofuels Alliance to position biofuels as a key solution for the global energy transition and contribute to socio-economic growth[21].

India is also a leading member of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), where climate change and environmental sustainability are key areas of cooperation. India leads the security sector, which includes energy and disaster management sub-sectors closely linked to climate risks and responses, providing opportunities for collaborative solutions beyond purely military-to-military engagement. India has already initiated numerous efforts, including Indian Navy-led Humanitarian Assistance and Disaster Relief (HADR) operations and exercises. Additionally,

India has led BIMSTEC Disaster Management Exercises in 2017 and 2020. The Indian National Centre for Ocean Information Services (INCOIS) supplies cyclone forecasts and tsunami alerts to countries in the Bay of Bengal, thereby strengthening regional disaster preparedness.[22]

The Indian Ocean Rim Association (IORA) serves as another key platform for fostering regional cooperation on security, trade, disaster resilience, and sustainable development. With 23 member states and 11 Dialogue Partners, many of which are highly vulnerable to climate change, IORA benefits from India's initiatives in areas such as the blue economy, renewable energy, capacity building, marine biodiversity conservation, and climate resilience. As the chair of IORA from 2025 to 2027, India's focus includes addressing resource constraints, ocean governance, and disaster risk reduction (DRR).[23]

Despite the presence of these regional institutions, there are gaps in infrastructure modernisation, such as ports, regional connectivity, and implementation, often limited by financial and technical constraints. Additionally, climate action is often fragmented and siloed. Furthermore, even with institutional mechanisms in place, issues like bilateral disagreements, political or economic instability, project delays, cost overruns, uneven burden-sharing, and limited sustainable financing hinder effective regional climate cooperation.

Against this backdrop, the lack of a coordinated regional framework leaves the IOR exposed to fragmented responses and strategic rivalry. Here, a set of climate cooperation principles could prove to be a decisive factor.

Climate Cooperation Principles for the IOR

Establishing climate cooperation principles for the IOR countries would create a shared roadmap for action, bridging fragmented efforts, reducing climate-driven geopolitical tensions, strengthening resilience, and enhancing sustainable development. These principles would serve as a foundation for harmonised policies, coordinated investments, and regional solidarity. They would facilitate turning climate vulnerabilities into opportunities for collective security, prosperity, and environmental stewardship. India's SAGAR vision, IORA chairmanship, BIMSTEC involvement, and initiatives like the Deep Ocean Mission, INCOIS, CDRI, etc., could provide a strong platform to operationalise the climate cooperation principles for the IOR nations, which would bring substantial benefits across environmental, economic, social, and geopolitical dimensions, as explained below.

Strengthening Regional Coordination and Response

The IOR faces shared climate vulnerabilities, including rising sea levels, cyclones, shifting monsoons, coastal erosion, ocean warming, and ecological degradation. A set of joint climate cooperation principles could provide a common framework for coordinating disaster preparedness and EWSs, particularly for cyclones, tsunamis, and floods; harmonising climate policies, standards, and response protocols across countries, reducing duplication, and improving efficiency; and encouraging cross-border data-sharing and joint research on climate impacts, marine ecosystems,

and oceanography. All this may pave the way for faster, more effective, and cost-efficient responses to climate crises that often transcend national borders.

Enhancing Climate Resilience and Adaptation

The principles could establish shared guidelines for resilience-building, including coastal infrastructure adaptation for ports, energy facilities, and transport corridors; ecosystem restoration and marine biodiversity protection; and community-level adaptation strategies for vulnerable populations – leading to reduced socioeconomic disruption, protected livelihoods, and strengthened regional food, water, and health security.

Mitigating Geopolitical Risks

Climate change is intensifying competition for resources, including fisheries, seabed minerals, and maritime boundaries. The shared principles could foster rules-based management of marine resources to minimise conflicts over fishing, seabed extraction, or maritime boundary disputes; support regional dialogue on climate-induced migration; and establish norms for joint disaster relief and humanitarian aid, preventing unilateral actions that might escalate tensions. Consequently, the region could see a reduced risk of climate-driven conflicts, enhanced regional stability, and a platform for cooperative security measures.

Facilitating Sustainable Economic Growth

Climate crises pose significant threats to trade, ports, supply chains, fisheries, tourism, and energy infrastructure. The principles could foster sustainable development policies and renewable energy investments, encourage climate-smart agriculture, fisheries management, and coastal urban planning, and support equitable participation in global carbon markets and mechanisms, such as the EU's CBAM. This could lead to improved economic resilience, protection of critical infrastructure, and better integration of regional economies into global sustainability frameworks.

Promoting Inclusive and Equitable Action

Climate change impacts are uneven, with Small Island Developing States (SIDS), coastal communities, women, children, the elderly, and low-income populations being disproportionately affected. The principles could prioritise equity, social inclusion, and protection for vulnerable groups in adaptation planning; establish mechanisms for burden-sharing and funding allocation to ensure that all countries can implement necessary climate measures; and foster community-driven approaches and localised solutions in harmony with national strategies. This would ensure that no country or community is left behind.

Driving Innovation and Knowledge Sharing

The principles can promote regional cooperation on climate-resilient infrastructure and thoughtful urban planning, as well as renewable energy, biofuels, ocean-based technologies, and EWSs, DRR, and climate monitoring – thereby speeding up innovation, improving preparedness, and strengthening long-term adaptation strategies across the IOR.

#	Principle	Action	Objective
1	Shared Responsibility and Solidarity	a. Recognise climate change as a common but differentiated responsibility (CBDR), with wealthier and industrialised nations supporting the adaptation and mitigation efforts of vulnerable states b. Promote equitable burden-sharing for climate action, including financing, technology transfer and capacity-building. c. Facilitate triangular cooperation, leveraging multilateral platforms to address local vulnerabilities with global expertise and resources.	Ensure inclusivity and fairness in addressing climate risks while enhancing regional trust
2	Coordinated DRR	a. Develop and implement joint EWSs for cyclones, tsunamis, flooding and other extreme weather events b. Standardise disaster response protocols across borders, including evacuation, humanitarian assistance and post-disaster rehabilitation c. Conduct regular joint disaster management exercises and simulations among the IOR countries	Minimise loss of life and economic disruption by improving the speed and efficiency of collective response
3	Climate-Resilient Infrastructure	a. Prioritise climate-resilient ports, transport networks, energy facilities and urban planning b. Develop regional guidelines for coastal adaptation, including mangrove restoration, shoreline stabilisation and flood-resistant construction c. Support knowledge sharing and technical assistance to implement adaptation infrastructure in vulnerable countries	Safeguards critical economic and social infrastructure, ensuring continuity of trade and services
4	Sustainable Marine and Natural Resource Management	a. Cooperate on sustainable fisheries management, ocean conservation, and biodiversity protection b. Establish joint monitoring of fish stocks, seabed minerals, and marine ecosystems to prevent overexploitation and disputes c. Harmonise policies on IUU fishing and promote resource-sharing frameworks	Reduce conflict over dwindling resources and ensures long-term ecological and economic stability
5	Regional Climate Science and Data Sharing	a. Encourage joint research initiatives on climate change impacts, marine ecosystems and ocean warming trends b. Standardise data collection and climate monitoring protocols across the IOR countries c. Establish a shared regional knowledge platform for forecasts, adaptation strategies and best practices	Evidence-based policymaking strengthens adaptive capacity and regional coordination

6	Sustainable Economic Development and Energy Transition	a. Promote renewable energy cooperation, including solar, wind and ocean-based technologies b. Encourage climate-smart agriculture, fisheries and urban planning to enhance resilience. c. Facilitate equitable access to global carbon markets, technology and financing mechanisms	Support sustainable growth while reducing greenhouse gas emissions and enhancing energy security
7	Inclusive, Community-Focussed Adaptation	a. Prioritise vulnerable populations, including SIDS, coastal communities and low-income groups in adaptation planning b. Foster community-led climate initiatives to ensure solutions are locally relevant c. Promote gender-sensitive policies recognising the disproportionate impacts of climate change	Ensure social equity and strengthen local ownership of climate action
8	Integrated Governance and Institutional Coordination	a. Enhance coordination between security, climate, and disaster management sectors at regional institutions such as IORA and BIMSTEC. b. Establish mechanisms to align bilateral, multilateral and regional initiatives to reduce fragmentation. c. Promote monitoring and evaluation systems to track implementation progress and identify gaps	Improve coherence and efficiency of regional climate action
9	Climate Diplomacy and Geopolitical Cooperation	a. Use climate cooperation as a platform to build trust, reduce conflicts and manage transboundary climate risks b. Encourage joint climate diplomacy to attract investments, technology, and support from industrialised nations c. Promote peaceful resolution of resource-related disputes, leveraging multilateral agreements and shared principles	Strengthen regional stability and leverages climate initiatives as a diplomatic tool
10	Continuous Review and Adaptive Policy	a. Conduct periodic joint assessments of climate vulnerabilities, adaptation needs and progress on implementation of the climate cooperation principles b. Encourage adaptive governance, adjusting strategies based on emerging risks, scientific findings and lessons learned. c. Foster regional innovation networks to trial new technologies and approaches to climate resilience	Ensure principles remain dynamic, evidence-based and responsive to changing circumstances

Given the strong case for cooperation on climate issues among the IOR nations, the following principles for such collaboration are proposed to enhance regional coordination, resilience, and sustainable development in response to the escalating climate crisis in the IOR.

The above principles offer a comprehensive roadmap for cooperation, ensuring that the IOR countries act collectively to mitigate climate risks, protect vulnerable communities, safeguard economic interests, and maintain regional stability. By adhering to shared responsibilities, harmonising policies, and leveraging regional institutions, the IOR can turn climate vulnerability into an opportunity for sustainable growth, resilience, and geopolitical stability.

At first glance, a shared set of climate principles appears to be a clear benefit. It could enhance trust, draw climate finance, and facilitate the coordination of science and policy across borders. However, the IOR is among the most diverse regions in the world, including least developed countries, SIDS, and major emerging powers. Variations in capacity, priorities, and governance traditions mean that a one-size-fits-all approach to principles will not be effective.

The first warning, therefore, is to prevent reinforcing inequality. Regional frameworks that do not consider CBDR risk marginalise smaller states. Wealthier economies, such as India, Australia, and Saudi Arabia, must explicitly commit to supporting capacity-building, technology transfer, and concessional finance for island and coastal nations facing existential threats.

A second risk concerns overstepping national sovereignty. Climate cooperation involves sensitive areas such as energy systems, marine resources, and migration policies. If regional mechanisms are perceived as infringing on domestic control, they will be politically difficult to accept. Therefore, cooperation should be voluntary, transparent, and based on respect for national laws. Technical partnerships like joint marine observation systems or shared early warning networks can foster trust without encroaching on sovereignty.

Equally vital is avoiding institutional overlap. The IOR already has several platforms, such as the IORA, the Indian Ocean Commission, and various United Nations-led initiatives. Establishing yet another secretariat or declaration risks squandering resources. Instead, the emphasis should be on connecting the dots and creating a "network of cooperation" that addresses institutional gaps rather than adding to them.

Climate finance will serve as the key test for any regional effort. Many small island and coastal states still face difficulties in accessing global climate funds due to complicated procedures and weak institutional capacity. Principles that tie assistance to governance reforms or geopolitical interests could foster mistrust. Therefore, the financing structure must be simple, inclusive, and transparent, with clear eligibility criteria and an expedited support system for the most vulnerable. While private investment is crucial, market mechanisms such as regional carbon pricing or offsets must be carefully designed to prevent trade distortions or disadvantaging smaller economies.

Effective policy relies on shared science, but data-sharing introduces its own challenges. Some countries may consider environmental data a matter of national security; others might lack the capacity

to collect or interpret it. The region requires common data standards, agreed-upon rules for use and access, and joint investments in research infrastructure. Simultaneously, scientific collaboration should not undermine local knowledge. Indigenous and coastal communities possess vital expertise in managing ecosystems and adapting to climate variability. Incorporating their voices into research and policy processes will enhance both legitimacy and effectiveness.

Perhaps the most delicate issue is the geopolitical context. The Indian Ocean is becoming more crowded with external powers, each advancing its own strategic agenda. If climate cooperation gets caught up with military or security rivalry, such as linking environmental aid to basing rights or maritime surveillance, it will damage trust. Therefore, climate cooperation must stay civilian, developmental, and sensitive to conflict.

Lastly, transparency in external financing is crucial. Any grants or loans should be accompanied by full disclosure of terms and conditions.

What should the climate cooperation principles actually look like?

They should serve as a blueprint for building trust. Firstly, they should be non-binding but politically significant to encourage buy-in without legal entanglement. Secondly, they should adhere to the principles of equity, transparency and adaptive governance, and be open to regular scientific reviews. Thirdly, they should only have a light regional secretariat or technical committee under the Indian Ocean Conference, IORA, or another trusted platform. Fourthly, they should facilitate the launch of pilot initiatives on mangrove restoration, cyclone early warning, blue carbon, etc., to demonstrate success and build momentum.

A Region at a Crossroads

The IOR's climate crisis is already a geopolitical challenge. As sea levels rise and ecosystems weaken, the decisions nations make today will determine whether climate cooperation fosters solidarity or becomes a new area for competition.

Building regional climate principles offers an opportunity to demonstrate that cooperation need not entail coercion, and that sovereignty and solidarity can coexist. If the region manages to strike this balance, it will not only safeguard its shared ocean but also show the world that multilateralism can still succeed in a divided era.

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Indian Leadership in Climate Diplomacy – An Assessment Of India's Multilateral Initiatives (ISA, CDRI and GBA)

Yashasvi Singh*

For India, the path to climate leadership runs through the twin goals of development and equity, bridging domestic ambition with global responsibility.

Introduction

India stands at a pivotal moment in global climate governance, facing the dual challenge of ensuring inclusive development for 1.4 billion people while fulfilling ambitious climate targets. This dual responsibility has positioned the country as both a vital stakeholder and an emerging leader in shaping international climate diplomacy.[1] While India is the world's third-largest emitter in absolute terms[2], its per capita emissions remain far below the global average, lending weight to its long-standing call for 'equity and climate justice' on the world stage.

Domestically, India has matched its commitments with action. It has pledged to reduce the emissions intensity of GDP by 45% from 2005 levels by 2030 and to achieve net-zero emissions by 2070. Notably, the country has already exceeded its Nationally Determined Contribution ("NDC") of sourcing 50% of its installed electricity capacity from non-fossil fuels well before the 2030 deadline[3]. This delivery record enhances India's international credibility and supports its growing role as a solutions provider, particularly for the Global South.

The Hon'ble Supreme Court of India has aptly summed the Indian stance as below[4]:

"*Beyond mere adherence to international agreements, India's pursuit of sustainable development reflects the complex interplay between environmental conservation, social equity, economic prosperity and climate change. Its national goals in this regard require a holistic understanding of sustainable development that balances immediate needs with long-term sustainability, ensuring that present actions do not compromise the well-being of future generations. It acknowledges that solutions to today's challenges must not only address pressing issues but also lay the groundwork for a resilient and equitable future*."

Even the central regulator of the country's monetary system, the Reserve Bank of India, is committed to supporting green initiatives and is working steadfastly to realise the vision of building a financial system that can not only withstand future climate shocks, but also actively contribute to India's journey towards a sustainable and resilient future.[5]

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This article explores how India is capitalising on this momentum in climate diplomacy through its flagship multilateral initiatives, including the International Solar Alliance, the Coalition for Disaster Resilient Infrastructure, and the Global Biofuels Alliance, among others. These platforms demonstrate India's strategic shift towards promoting fair cooperation, technology sharing, and South-South partnerships, which are increasingly vital for driving collective global climate action.

The International Solar Alliance (ISA): Charting a New Era in Global Climate Diplomacy

Introduction and Genesis

The creation of the ISA represents a watershed in global climate governance, reflecting both the urgency of energy transition and the promise of South-South cooperation. Initiated by Prime Minister Narendra Modi and launched in collaboration with then-President Francois Hollande of France on 30 November 2015 at COP21 in Paris, the ISA emerged from the strategic need to implement the Paris Agreement.[6] It also holds the distinction of being the first treaty-based intergovernmental organisation headquartered in India, located in Gurugram, Haryana.

The ISA's founding vision was based on the shared reality of solar-rich nations located between the Tropics of Cancer and Capricorn; countries blessed with plentiful sunlight but burdened with energy poverty and high investment risks. India referred to these nations as "Suryaputra" or "Sons of the Sun," emphasising their collective potential. The primary objective was clear: to increase demand for solar technologies and financing across developing economies, thereby lowering costs, reducing policy uncertainties, and attracting the private capital necessary for a clean energy transition.

Strategic Mandate and Importance

The ISA's mission is embodied in its 'Towards 1000' strategy, which aims to mobilise over USD 1 trillion in solar investments by 2030 and to support the deployment of 1,000 GW of new solar generation capacity.[7] Its strategic relevance can be assessed through three critical dimensions:

1. Climate Mitigation and Energy Access (SDGs 7 & 13): By prioritising solar deployment, the ISA directly promotes Sustainable Development Goals 7 (Affordable and Clean Energy) and 13 (Climate Action). For developing nations, solar energy offers a dual benefit: (i) supporting industrialisation while avoiding carbon lock-in, and (ii) providing decentralised, clean power to nearly one billion people who still lack reliable electricity.
2. Market Aggregation and De-risking: At its core, the ISA is an innovative force in the economy. By consolidating demand for solar technology and facilitating collective procurement, it achieves economies of scale that lower the Levelized Cost of Electricity ("LCOE"). More importantly, it acts as a de-risking platform, making volatile political and financial markets more appealing for foreign direct investment. This role is crucial for driving solar infrastructure development

in regions that have traditionally been overlooked by global capital.

3. South-South Cooperation: Unlike traditional aid frameworks between the more developed and the less developed or developing economies, the ISA embodies a horizontal model of partnership. Its initiatives, such as the STAR-C programme[8] for capacity building, foster knowledge exchange, technology transfer, and collaborative innovation across the Global South. This positions the ISA not merely as a donor-recipient model, but as a platform for shared problem-solving.

Challenges and Constraints

Despite its ambitious mandate, the ISA confronts significant constraints that temper its transformative potential.

1. Financial Mobilisation: The ISA's USD 1 trillion target remains formidable. Actual capital inflows, especially to Least Developed Countries ("LDCs") and Small Island Developing States ("SIDS"), have been slow. Conventional policy harmonisation is inadequate to bridge the financing gap. Without effective risk-mitigation mechanisms, private investors remain hesitant to commit to projects in fragile markets.
2. Geopolitical Limitations: Although the ISA enhances India's global stature, its influence is limited by structural realities. India does not dominate low-cost solar manufacturing, which is primarily led by China, and cannot yet match the scale of concessional finance provided by Western institutions. These restrictions currently hinder its ability to turn diplomatic capital into tangible economic benefits.
3. Policy and Regulatory Barriers: Within member states, bureaucratic inertia, inconsistent grid infrastructure, and retroactive policy changes weaken investor confidence. Such governance challenges risk delaying project implementation despite ISA's efforts at aggregation and standardisation.
4. Challenges in Cross-Border Grid Connectivity: The ISA's primary focus on off-grid solar projects has raised concerns about its ability to handle the much more complex task of developing cross-border grid links.[9]

Potential, Impact, and Future Role

The ISA's long-term potential lies in its ability to promote systemic change. Initiatives such as One Sun, One World, One Grid ("OSOWOG"), first proposed by the Prime Minister of India at the inaugural assembly of the ISA,[10] although technically complex, exemplify this goal; imagining a globally connected solar grid where the sun's energy is harnessed continuously across different time zones.

By anchoring its mandate in solar energy, the most abundant renewable resource across its member states, the ISA is uniquely positioned to advance decarbonisation while simultaneously promoting inclusive development. Its impact will ultimately be measured not merely in gigawatts installed but in avoided emissions, improved energy

security, and the creation of sustainable livelihoods. In this sense, the ISA's promise extends well beyond infrastructure. It is a vehicle for reshaping the global energy order.

Recommendations for Enhanced Effectiveness

To realise its full potential, the ISA needs to refine its institutional and financial architecture. Three scholarly recommendations are especially noteworthy:

1. Establish a Risk-Guarantee Fund: The ISA should set up an internationally supported Solar Risk-Guarantee Mechanism, collaborating with Multilateral Development Banks ("MDBs") and donor countries. By offering first-loss guarantees, this fund could bridge the trust gap between cautious financiers and high-risk markets, particularly in LDCs and SIDS.
2. Promote Local Manufacturing and Technology Transfer: To reduce reliance on limited sources within the global supply chain, the ISA should actively support the development of regional solar manufacturing hubs in Africa, Latin America, and Asia. This would diversify production, foster local industrial ecosystems, and enable member states to collaborate effectively in adding value to the solar economy.
3. Integrate Storage and Grid Solutions: The intermittency of solar power remains a core challenge. The ISA should lead the development of a Global Storage Facility and invest in advanced battery technologies to transform solar energy from intermittent to a reliable base-load source. It is also worth noting that the Minister for New and Renewable Energy (MNRE), Government of India, has recently stated that the country is developing some of the world's most advanced high-efficiency cells, such as TOPCon or Tunnel Oxide Passivated Contact. Additionally, research institutes are advancing Perovskite technology, refining it for practical use, which is all part of the broader vision for a fully integrated Swadeshi infrastructure.[11]

As the urgency of climate action intensifies, the ISA offers a pragmatic yet ambitious pathway, one where the sun becomes not only a source of light but a cornerstone of global climate justice.

The Coalition for Disaster Resilient Infrastructure (CDRI): Towards Global Risk Governance

Introduction and Genesis

Following the ISA in 2015, the establishment of the CDRI in 2019 marks a significant milestone in India's progressive climate diplomacy. The CDRI seeks to address the systemic vulnerabilities of global infrastructure systems to climate and disaster risks. Launched by the Prime Minister of India at the United Nations Climate Action Summit in New York on 23 September 2019, the CDRI became an international organisation in 2022. It is a multi-stakeholder partnership involving national governments, UN agencies, MDBs, the private sector, and academic institutions, operating with an interim secretariat in New Delhi, India.

The foundational idea for the CDRI was

inspired by a crucial policy realisation that the cascading failure of infrastructure systems (power, transport, telecommunications, water) during extreme events accounts for a significant portion of economic losses and disrupts vital services, hindering long-term development progress.[12] This realisation was reportedly prompted by India's experience, especially the aftermath of the 2001 Gujarat earthquake. The concept was officially outlined during the 2016 Asian Ministerial Conference on Disaster Risk Reduction, placing resilient infrastructure at the centre of sustainable development. The CDRI was thus established to change the global approach from a reactive, disaster-response model to a proactive, prevention-focused strategy emphasising capacity building before a catastrophe occurs.

Strategic Mandate and Importance

The primary aim of the CDRI is to enhance the resilience of both new and existing infrastructure systems against climate and disaster risks, thereby supporting sustainable development across all member states. Its mandate is closely aligned with the 2030 Agenda for Sustainable Development, the Paris Agreement on Climate Change (SDG 13), and the Sendai Framework for Disaster Risk Reduction.[13]

The significance of the CDRI can be examined through three functional pillars:

1. Systemic Risk Mitigation: Disasters highlight the interconnectedness of modern infrastructure. A failure in the power grid can disrupt telecommunications, impact water supply pumps, and halt transport systems. The CDRI prioritises systemic resilience, moving beyond protecting individual assets to understanding and managing cross-sectoral dependencies. By concentrating on critical sectors such as power, transport, health, and telecommunications, the CDRI aims to safeguard society's essential "lifelines".
2. Global Knowledge Platform: The CDRI serves as a vital hub for knowledge generation and exchange. It develops global methodologies, such as the Infrastructure Resilience Review (IRR) methodology, in collaboration with the United Nations Office for Disaster Risk Reduction (UNDRR), and formulates guidance like the framework for heat-resilient infrastructure. This technical capacity building assists countries, especially Least Developed Countries (LDCs) and Small Island Developing States (SIDS), the latter supported through the Infrastructure for Resilient Island States (IRIS) initiative, in updating their national codes, standards, and policy frameworks to incorporate disaster risk reduction (DRR).
3. Financial De-risking: The global average annual loss (AAL) due to infrastructure damage from disasters is estimated to be hundreds of billions of dollars, representing a significant fiscal challenge. The CDRI works to embed resilience into investment decisions by making the economic case for prevention. By providing tools for cost-benefit analysis and advocating for risk-informed financial taxonomies, it aims to attract private capital and MDB support, establishing resilient infrastructure as a distinct and viable asset class.

Challenges and Constraints

Despite its clear mandate and high-level support, the CDRI faces complex and multifaceted challenges.

1. Institutional and policy fragmentation within member countries creates a significant challenge. Infrastructure planning, DRR, and climate change adaptation often function separately, causing bureaucratic delays and inconsistent application of resilience standards. Addressing this fragmentation requires profound institutional reform that the CDRI can only suggest, not enforce.
2. The financing gap for resilience remains significant. Although the economic case for investing in resilience is evident, with returns estimated at up to 6:1 in avoided losses, converting this into bankable projects for risk-averse private investors, particularly in high-risk regions, is challenging. The difficulty lies in moving beyond policy documents to establishing resilient, sovereign-backed risk-sharing mechanisms that lower the capital costs for such projects.
3. Data and technological hurdles remain. Effective resilience planning demands detailed, multi-hazard risk data and advanced modelling, which are often unavailable or inaccessible in developing countries. Closing this data gap to guide resilient design and policy is essential for CDRI's success.

Potential, Future Role, and Recommendations

The CDRI is poised to play an increasingly vital role in the future, especially in tackling the interconnected challenges of climate change and pollution. By promoting infrastructure capable of withstanding extreme weather events, CDRI also supports climate adaptation and resilience. Additionally, resilient infrastructure, such as distributed and climate-resilient power grids, enables the continuous operation of green technologies, including electric vehicle charging networks and water treatment plants, which are crucial for reducing pollution and achieving net-zero targets. Emphasising the resilience of existing infrastructure is a key part of sustainable development, ensuring that new investments avoid repeating the mistakes of previously vulnerable, carbon-intensive practices.

To maximise its effectiveness, the following recommendations are suggested:

1. Mandate Resilience Audits: The CDRI should promote the global adoption of compulsory, systemic resilience audits for all significant public infrastructure investments, directly linked to MDB lending conditions.
2. Establish a Sovereign Risk-Sharing Facility: To address financing constraints, the CDRI should advocate for the creation of a pooled, multilateral Sovereign Resilience Investment Fund. This fund would offer concessional financing and credit guarantees specifically for resilience-enhancing retrofitting and new DRI projects in vulnerable nations, effectively bridging the

gap in risk-return expectations for private finance.

3. Promote Nature-Based Solutions (NBS): The CDRI should strengthen its focus on integrating NBS, such as restoring wetlands, mangroves, and urban green spaces into infrastructure planning. These solutions often deliver resilience benefits (e.g., coastal protection and flood attenuation) alongside co-benefits in pollution reduction and biodiversity enhancement, providing a holistic approach to sustainable infrastructure.

By adopting these strategic enhancements, the CDRI can reinforce its position as the leading global partnership, fostering systemic resilience and ensuring that the infrastructure supporting human progress remains secure against future threats.

The Global Biofuels Alliance (GBA): Towards Energy Transition

Introduction and Genesis

Following the ISA and CDRI, a third India-led initiative was launched at the G20 New Delhi Leaders' Summit on September 9, 2023, in the form of the GBA. Its creation marks a significant collaborative effort among major biofuel producers (such as the United States, Brazil, and India) and consumers, aimed at accelerating the global development and adoption of sustainable biofuels. The GBA is organised as a multi-stakeholder partnership involving governments, international organisations (including the IEA and World Bank), and industry bodies.[14] Its main aim is to position biofuels as a key element of the global energy transition, advancing beyond fossil fuels to reach net-zero emission targets.[15]

The core idea behind the GBA stemmed from two main goals: improving global energy security and addressing climate change, especially in the difficult-to-decarbonise transport sector. Major biofuel-producing nations, such as India, aimed to utilise their domestic biomass resources to decrease reliance on expensive imported crude oil, a realisation strengthened by global geopolitical instability. This merging of energy security and climate objectives, facilitated through the G20 platform, positioned the GBA as a vital mechanism for unifying disparate national biofuel policies and establishing international standards for sustainability and trade.

Strategic Mandate and Importance

The core objective of the GBA is to encourage sustainable use of biofuels by catalysing policy exchange, technical assistance, and the adoption of internationally recognised standards.[16] Its strategic significance resides in three key areas:

1. Decarbonisation of Challenging Sectors: Biofuels, especially Sustainable Aviation Fuel (SAF) and bio-based diesel, provide some of the few viable, commercially available solutions for decarbonising heavy transport, aviation, and shipping, where direct electrification is not yet practical. The GBA supports the necessary technological progress, such as second-generation and third-generation biofuel processes, which utilise non-food feedstocks like agricultural residue and algae, thereby addressing the food versus fuel dilemma.

2. Market Mobilisation and Standardisation: The GBA aims to establish a global virtual marketplace, enabling the mapping of demand and supply and reducing reliance on fragmented regional markets. By developing strong sustainability codes and certification procedures, the GBA intends to minimise investment risks, encourage international trade, and unlock the significant growth potential forecasted by the International Energy Agency (IEA), which predicts a required 3.5 to 5-fold increase in biofuels by 2050 to reach net-zero targets.
3. Global South Empowerment: By emphasising capacity building and technology transfer, the GBA offers developing nations and emerging economies a pathway to energy self-sufficiency, rural economic growth, and lower import costs, thereby aligning the energy transition with the SDGs.

Challenges and Constraints

1. Sustainability Paradox: Despite its ambitious mandate, the GBA faces significant challenges. The primary issue is the 'Sustainability Paradox'. While biofuels produce lower end-use emissions than fossil fuels, unsustainable production practices, such as converting highly biodiverse land for energy crops, can lead to high indirect land-use change (ILUC) emissions, potentially offsetting the climate benefits. The alliance must ensure a comprehensive life cycle assessment is mandated to prevent carbon leakage.
2. Financing and Technology Gap: Advanced (second and third generation) biofuel technologies are capital-intensive and lack economies of scale, making them less competitive than subsidised fossil fuels. Mobilising large-scale private capital for infrastructure, such as bio-refineries and distribution networks, especially in risk-sensitive developing nations, remains difficult without strong sovereign guarantees.
3. Supply Chain Risks: Feedstock security and variability present challenges that demand international policy coordination to mitigate.

Potential, Future Role, and Recommendations

The GBA is poised to play an increasingly vital role in reaching global climate goals. By encouraging feedstocks made from waste (e.g., agricultural residue, municipal organic waste), GBA directly helps reduce pollution, providing solutions like Compressed Bio Gas (CBG) that tackle issues such as crop stubble burning and methane emissions. Its success is crucial for closing the 2050 Net Zero Emissions pathway gap identified by the IEA, especially in sectors that are difficult to electrify.

To maximise its effectiveness, the following recommendations are suggested:

1. Implement robust ILUC and Water Use Mandates: The GBA must immediately define and enforce strict, measurable metrics to exclude high-risk land-use changes and water-intensive feedstocks from its approved certification standards.

2. Establish a dedicated R&D and de-risking facility: a specialised fund should be set up to offer concessional finance and risk guarantees for scaling 2G and 3G biofuel technologies, thereby lowering the cost of capital and enabling rapid commercial parity with conventional fuels.
3. Integrate Biofuels into Carbon Pricing: The GBA should promote international carbon pricing systems that explicitly recognise the verified life-cycle carbon reductions of sustainable biofuels, establishing a clear economic benefit over fossil fuels.

By adopting these strategic policy instruments, the GBA can evolve from a policy forum into a leading force promoting global, sustainable bioenergy deployment, thereby ensuring a cleaner and more secure energy future.

Conclusion

Carbon neutrality goals are admirable, but their realisation requires not only ambition but also strong institutional capacity and practical initiatives. For developing nations, this challenge is increased by the need to address urgent development priorities. The task, therefore, involves finding a careful balance, progressing with climate transitions while also strengthening resilience to protect growth.

The establishment of the GBA at the G20 Summit marked the culmination of a new era in Indian climate diplomacy, building on the achievements of the ISA and the CDRI. These three initiatives collectively signify a clear and decisive shift in India's international stance. Where India's foreign policy on climate was once primarily defensive, advocating for the principle of Common but Differentiated Responsibilities (CBDR), it has now confidently shifted to a proactive role as a global leader and architect of practical, scalable solutions. This embodies India's 'Resource Diplomacy'.

The ISA mobilises solar finance across the Global South; the CDRI concentrates on infrastructure resilience, a vital yet often neglected aspect of climate adaptation; and the GBA advocates for the deep decarbonisation of hard-to-abate sectors through sustainable waste-to-fuel technologies. By integrating its national goals—such as reducing dependency on crude oil, alleviating urban pollution, and increasing rural incomes—into these global frameworks, India ensures that the energy transition remains inclusive, equitable, and responsive to the needs of developing countries. This proactive multilateral approach not only accelerates global climate action but also strategically positions India as an essential leader, capable of mobilising consensus and driving constructive change within the emerging world order.

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An Interview with Dr. S.P. Yadav, Director General, International Big Cat Alliance (IBCA)

Shashvat Singh*

Shashvat Singh:

India's climate action strategy is becoming increasingly holistic, and we are today integrating conservation, technology, and diplomacy. To speak on these and other issues, we have with us Dr SP Yadav, Director General of the International Big Cat Alliance (IBCA). The IBCA is a global initiative to conserve seven major big cat species. Dr Yadav has been instrumental in shaping India's Wildlife Conservation efforts and in advancing the global dialogue on biodiversity and climate resilience. To begin this discussion, let me ask you, Dr Yadav, about India's conservation efforts and the role we are playing internationally.

Dr. S.P. Yadav:

I believe that India is assuming a leadership role in the negotiations on climate change and biodiversity conservation. If you examine the principles shared by Western countries and India, you will notice a significant difference. Western nations' principles or ethos are mainly anthropocentric or human-centric. However, if you look at India, you'll see that our culture has traditionally been nature-centric. We refer to Nature and Earth as 'Mother'. Sustainability, as well as biodiversity and wildlife conservation, have been at the heart of our philosophy and principles in all these ongoing negotiations.

*__Dr. S.P. Yadav__ *is the Director General of the International Big Cat Alliance (IBCA). Dr Yadav, an avid wildlife enthusiast, is well known for his contribution towards conservation of big cats especially Tiger and Cheetah in India. He served as an officer of the Indian Forest Service (1989 batch/ Uttar Pradesh Cadre) for the past 35 years and has successfully led the conservation agenda of Project Tiger, Cheetah, Lion and Elephant while working in the Ministry of Environment, Forest & Climate Change, Government of India; National Tiger Conservation Authority; and Global Tiger Forum. He spearheaded the first ever wild to wild, intercontinental, translocation of Cheetah from Africa to India. He held several responsible senior positions in the Government like the Addl. Director General of Forests (Project Tiger & Elephant; Forest Conservation; Wildlife); Member Secretary of the National Tiger Conservation Authority; Director of Wildlife Institute of India; Member Secretary of Central Zoo Authority; and CITES Management Authority of India. Dr Yadav was conferred with the prestigious National Award for Wildlife Conservation by the Government of India and with the first Global Leadership Award in Conservation by the Global Tiger Initiative Council. Recently he has been conferred with the International Crystal Compass Award by the Russian Geographical Society for his contribution in tiger conservation in India and efforts to promote tiger conservation at global level. The award, often called as "geographical Oscar" was presented to him on 29 May, 2025 at Moscow. He has joined IBCA as Interim Head on 12 March 2024 and sworn in as Director General on 16 June, 2025.*

*__Shashvat Singh__ *is a Senior Research Fellow for Climate, Development, and Energy Cooperation at India Foundation. He brings about 15 years of experience in applied research, systems thinking, and policy integration across climate, energy, and development sectors. He has a deep grounding in India's clean energy transition and the frameworks of the Sustainable Development Goals. He has contributed to national strategies and authored multiple reports and policy briefs on climate action. He is an alumnus of the Institute of Rural Management Anand, and the University of Pune. For his contribution to policymaking and thought leadership, he has been recognised as a 'Rising Star' by NITI Aayog – the Government of India's premier policy think tank.*

We embody the conservation principles. Our ancient systems and forefathers were very wise. They linked our lifestyles and religion with all conservation ethos and principles. We worship most animals; we have associated these animals with gods and goddesses, and this is how we respect our forests and wildlife. Therefore, biodiversity conservation has been at the core of all our negotiations. India's leadership has always valued and respected biodiversity conservation.

Shashvat Singh:

Moving to our next question, the IBCA has gained global recognition as a symbol of ecological leadership. Could you clarify what motivated its establishment and how this initiative reflects our country's vision of planetary responsibility and South-South cooperation?

Dr. S.P. Yadav:

The IBCA is the vision of our Prime Minister, Shri Narendra Modi. During the 2019 Eastern Economic Forum in Vladivostok, Russia, it was first mentioned that there is a need to ally with countries to protect big cats and biodiversity. Finally, with the cabinet's approval, the IBCA was established on 12 March 2024. The tiger is our national animal and a symbol of wildlife conservation in India and of India's biodiversity. 58 tiger reserves cover more than 84,000 square kilometres of fully protected habitat. Therefore, all biodiversity is conserved within this area. The IBCA includes seven big cats — tiger, lion, leopard, snow leopard, cheetah, jaguar, and puma — that are found across 95 countries.

Looking back at history, in 2010, for the first time, leaders, including the ones from Tiger Range countries, met in Saint Petersburg, Russia, for the Global Tiger Summit. Since tigers are highly endangered, this was the first summit organised specifically for a big cat. All countries and their leaders committed to doubling their tiger numbers by 2022. However, this did not happen; many countries like Lao PDR, Vietnam and Cambodia lost all their tigers. In fact, today, tiger numbers are increasing only in India, Bhutan, Nepal and Russia. In other countries, the numbers are either declining, static, or, as mentioned, some have lost all their tigers. Despite increased awareness, political commitment and resources allocated for tiger conservation, the situation remains unsatisfactory. Nonetheless, India has been successful and is a global leader in tiger conservation. We hold over 70% of the world's tiger population. Therefore, India remains at the forefront of tiger conservation.

If we examine the leopard population, we have the most extensive leopard range in the world. We have approximately 15,000 leopards. The African Lion population, which we often see on TV channels, is declining rapidly. India is the sole habitat for the Asiatic Lion. Their population is showing a healthy growth rate over the years, and is now around 900. The snow leopard population, which inhabits mountainous regions and snow-capped peaks, remains relatively stable, and we have the third-largest population.

The cheetah is the only native mammal in our country that faces widespread threats. The last cheetah was shot in December 1947 in the Koriya district of Chhattisgarh. In 1952, we declared the

cheetah extinct. Since then, the Indian Board of Wildlife decided to reintroduce it because it is the only mammal we have lost. It took over 70 years, but we have successfully reintroduced the cheetah to our country. Among the seven big cats, we hold a very prominent position in five.

Since all seven big cats are facing survival challenges, we need to protect their habitats and biodiversity in their name. That is why India, which has five of the seven big cats, plays a leadership role. In fact, we can support many countries in reviving their big cat populations or halting their decline. This is why India has taken the lead in helping other nations protect their biodiversity and habitats under the banner of big cats.

Shashvat Singh:

It's so heartening to hear, Sir, that we have taken a commanding position when it comes to conservation of the big cats. Generally, when we see climate change and biodiversity loss, we treat them as parallel issues, but they are deeply interconnected. How is the IBCA seeking to address this nexus in its work through its partner organisations and partner nations?

Dr. S.P. Yadav:

Yes, climate change and biodiversity loss are sides of the same coin. Climate change causes biodiversity loss and biodiversity loss contributes to climate change. So, it's a serious issue. In fact, most countries face this challenge, and it is recognised worldwide. It's not only island nations like the Maldives or small countries that are suffering; even developed and large countries are experiencing this problem. According to the report, biodiversity loss is severe due to the unsustainable exploitation of natural resources. We are losing species at an alarming rate, which is highly concerning. We are all aware of global warming. We are also witnessing the natural disturbances such as shifting rainfall patterns, rising temperatures and destructive cyclones, tsunamis, tornadoes, floods and landslides - all resulting from climate change. Both issues are deeply interconnected, and the solution is clear.

Like you conserve your forests and wildlife in the name of nature. You need to prevent carbon emissions from entering the atmosphere and harming wildlife. The best way to sequester carbon is through forestation. By protecting biodiversity, you help mitigate climate change because you are not only locking carbon in tree growth, but also preventing its release. This acts as a form of climate regulation, along with soil and moisture conservation. An interesting fact is that big cats contribute to or represent biodiversity conservation. Let us take the example of tigers in our country.

As I mentioned, there are 58 tiger reserves and over 84,000 square kilometres of habitats protected in the name of tigers. You might find it hard to believe that more than 600 freshwater streams and rivers either originate within tiger habitats or have their main catchment areas there. Therefore, for the water security of the country, protecting tigers is essential, as these habitats are safeguarded in their name. By doing so, we secure freshwater for drinking, which is a pressing issue now since India only possesses 4% of the world's freshwater reserves. We are supporting around 17% of the human population and 18% of the cattle population. All these reserves serve as repositories

of biodiversity because our laws are very strict like the Wildlife Protection Act. If you look at the big cat habitats, such as tiger reserves, there is a core zone, a surrounding buffer zone, and then a corridor. The core zone is kept completely inviolate as per the law, meaning no developmental activities or very minimal human interference. Through strict protection, biodiversity is preserved, and this is how big cat and biodiversity conservation contribute to mitigating climate change.

Shashvat Singh:

Big cats are apex predators and keystone species. Please explain how their conservation contributes to broader ecosystem resilience and, by extension, to climate stability.

Dr. S.P. Yadav:

So, we have seen the example of tigers; I just gave an example of freshwater and how we obtain it. Besides freshwater, there are numerous ecosystem services such as climate regulation, microclimate control, soil and moisture conservation, and prevention of landslides and soil erosion. In the name of conserving these big cats, we also strengthen the ecosystem services. Take the example of the snow leopard. The snow leopard is a key indicator of climate change because it requires a habitat with snow-covered or snow-capped mountains and hillocks. If a snow leopard is found there, it indicates that the mountainous ecosystem is in balance. However, if snow leopards disappear or their population declines, it signals that something is wrong, likely due to global warming or climate change. These snow leopards are often called the 'ghosts of the mountains', and by conserving their habitat in their name, we protect and preserve these regions. This, in turn, ensures the flow of freshwater to rivers like the Ganges, which derives its water from glacier meltwater. Therefore, they are very important.

Similarly, if you see Jaguars and Pumas, they are found in the Americas. Regarding Jaguars, you must have heard about the Amazon rainforest. All these forests are being protected and they provide immense ecosystem services. If biodiversity is preserved and conserved, then it can be sustainably utilised for the benefit of humankind. There are several wild cultivars from which our domesticated varieties of food are developed through selection and different plant breeding methods. These are repositories of enormous wealth and can be sustainably utilised by humans for their benefit. However, before that, you need to protect and conserve all this biodiversity and the habitat of big cats.

The situation is similar with other big cats like lions and cheetahs because they are all apex predators. When an apex predator such as a tiger is present, it indicates that the entire ecosystem below it is in balance and functioning well. A balanced ecosystem provides various ecosystem services. If a tiger is absent, it suggests that the ecosystem is out of balance. Apex predators regulate the population of herbivores, preventing their numbers from increasing excessively and damaging the ecosystem by overgrazing on grasses. By controlling herbivore populations, apex predators help regulate the overall ecosystem, including the number of tigers. For example, to sustain one tiger, about 500 to 550 spotted deer are needed, as this maintains the tiger's survival.

This indicates that if 550 spotted deer are available, one tiger can survive year-round on a sustainable basis. Supporting 500 to 550 spotted deer requires a large area, which in turn means that one tiger needs that much space to maintain the balance of the entire ecosystem.

Therefore, the role of an apex predator becomes very important in maintaining the ecosystem and biodiversity of that area. By preventing the unlimited increase in herbivore population, it also helps in regenerating the forest. This is a complex relationship, but very vital for our existence.

Shashvat Singh:

Sir, how can landscape-based conservation, such as maintaining wildlife corridors or habitats, support climate adaptation?

Dr. S.P. Yadav:

India has already adopted landscape-based conservation. Many countries are also doing the same. Since it is not only about protected areas, such as tiger reserves, their surrounding environments also affect biodiversity conservation. Therefore, in landscape management, we consider and manage the entire area around these protected zones. This may include agricultural land, river systems, grasslands, and meadows. Holistic management is necessary, and for that, a landscape-level approach is essential because all external factors, such as development, and roads and railways, impact the habitats of wildlife or protected areas. Thus, landscape-level management is very important and the appropriate step to take.

Just as development is needed and most countries are developing economies, you need employment, development, and growth, specifically economic growth. But where will it come from? When considering landscape-level management, you implement mitigation measures that maintain checks and balances on these developmental activities, ensuring they do not adversely impact wildlife or conservation efforts. Therefore, landscape-level management becomes extremely important. We must consider the people living in the fringe areas. It is not feasible to treat wildlife in isolation and manage only wildlife. Many people, particularly the poor, depend on forest resources for daily essentials like fuel, wood, fodder and employment. They cannot be treated separately. Hence, landscape-level management is crucial because individual land use impacts and influences our wildlife conservation.

Now, any developmental activities in our country that take place require the adoption of mitigation measures if they pass through forest land or protected areas. For example, the national highways include wildlife underpasses and overpasses, which are expensive but essential, and the Ministry of Environment, Forest and Climate Change does not grant permission for these development projects without them. India is setting an example and acting as a role model. The longest underpass is between Kanha and Pench tiger reserves. When it was proposed, there was a lot of opposition due to the high costs, but now everyone is pleased because traffic flows smoothly on this route and all animals, including tigers, deer and sambar, can use the designated areas freely.

Shashvat Singh:

In fact, I have seen several instances on social media of elephants crossing highways.

Dr. S.P. Yadav:

Elephants, like other animals, require corridors because habitat fragmentation is a major issue. To prevent developmental activities from adversely impacting these animals, safe passages are necessary. Therefore, for elephants as well, such mitigation measures are prescribed when wildlife clearance or forest clearance is accorded by the Ministry of Environment, Forest and Climate Change.

Shashvat Singh:

Sir, as a nation, we have played a pivotal role in bridging the gap between developed and developing countries in both climate and biodiversity negotiations. How is the IBCA advancing this leadership through international partnerships?

Dr. S.P. Yadav:

In fact, the IBCA is a symbol of leadership from the Global South, promoting South-South cooperation. As I mentioned, it was founded by the Government of India (GoI) and our leadership role in the conservation of big cats has been well established based on our successful track record. The Alliance includes 95 Range Countries across the Americas, Africa and Asia. Most of these nations are either low-income or lower-middle-income countries; very few are developed nations. The crisis of biodiversity loss, climate change, and the declining populations of big cats and other wildlife are very apparent. Therefore, these countries need resources, technology, skills and capacity-building. This is where the IBCA plays a crucial role in supporting these countries. In today's age, it becomes essential because there is no need to reinvent the wheel; instead, we can share best practices, knowledge and skills with other nations.

The IBCA draws its strength from India's success, which has demonstrated leadership in the effective conservation of big cats and biodiversity. This serves as a role model for other countries to follow. Many nations have requested support in capacity enhancement, skilling and technology, such as Cambodia, which has lost all its tigers. It wants to learn from India about the tiger reintroduction. India has had success with its first tiger reintroduction experience in the world at Sariska Tiger Reserve, followed by Panna Tiger Reserve. The IBCA and the GoI are assisting the Government of Cambodia in this. Thus, the IBCA supports countries by helping them identify their gaps and knowledge deficiencies, and by assisting wherever needed.

Shashvat Singh:

Looking ahead, how do you see the concept of conservation diplomacy evolving, particularly in relation to climate cooperation and biodiversity frameworks like the Global Biodiversity Framework? How do you see this evolution unfolding?

Dr. S.P. Yadav:

This big cat conservation is part of soft diplomacy or green diplomacy because there are various geopolitical issues where dialogue is difficult. However, on big cat conservation issues, it is crucial because they affect countries and their

populations. Thus, this forms an extremely important aspect of green diplomacy, soft diplomacy or big cat diplomacy, which can be facilitated through the IBCA. In fact, big cat habitats are not confined to political boundaries. For example, the Sundarbans in West Bengal, extend across borders into Bangladesh. If tigers do poorly in Bangladesh, it will surely impact India as well. Similarly, from forests of Valmiki Nagar, Dudhwa and Katarniaghat, tigers, rhinos and elephants cross into Nepal. These are transnational issues and the power of big cat diplomacy as a form of soft or green diplomacy is vital because it unites countries in their efforts to conserve these species. Therefore, it is an invaluable tool for negotiations, cooperation, and collaboration.

Shashvat Singh:

Perhaps it can also contribute to global peace. Sir, you already provided a glimpse of how technology is vital for biodiversity conservation and how the IBCA has been assisting countries in this area. We now have several AI-based monitoring and satellite mapping systems. How is the IBCA utilising technology to improve conservation outcomes?

Dr. S.P. Yadav:

Let us once again revisit history. Before 2002, the tiger population was estimated by analysing their footprints. When a tiger walked on the ground, it left its footprints, which were then made into plaster casts. Based on these casts, tigers were counted. However, this method has limitations because footprints vary depending on whether the tiger walks on soft soil, hard ground, sandy terrain or rocky surfaces. Consequently, this counting technique was unreliable, often leading to underestimation or overestimation.

In 2005, India lost all the tigers in Sariska Tiger Reserve, which led us to consider involving science. Consequently, a counting method was developed using technology, camera traps, and statistical models. The entire area is now divided into 2 square-kilometre grids, with a pair of cameras placed in each. Tiger stripes are like our fingerprints; they never match, similar to biometric details. Automated cameras take photos of a tiger when it walks within a grid, and these images are then analysed using software with artificial intelligence. This process establishes the unique identity of each tiger.

India has been leading in this field. India holds the Guinness World Record for deploying the most cameras for animal counting or estimation. We have used this science very effectively. Satellite monitoring is essential. When we introduced the cheetahs, they were fitted with radio collars equipped with satellite tracking so we could monitor their movements and understand their behaviour, social dynamics, and home ranges. Their acoustics were used to identify individual animals. There is electronic surveillance, with 24/7 monitoring via thermal and long-range infrared cameras.

Numerous technological advancements are employed in countries like India and other parts of the world. The IBCA organises capacity-building programmes in the Range Countries, providing practical guidance on these technologies. GIS mapping of habitats is crucial. India uses M-STrIPES software to monitor tiger stripes and ensure intensive protection of tigers and their

ecosystems. It is an app-based tool where, after patrolling, guards must switch it on, recording their patrol paths and any illegal activities. When they return, this data is collected by a computer, sent to a server and analysed. This process is known as smart patrolling.

Moreover, there are numerous advances that these countries, particularly India, have made, and the IBCA is working to increase the capacity of other Range Countries, such as Russia. It is learning how to use camera traps and how to interpret these photographs to monitor their highly endangered Amur leopards. Different kinds of technologies are available in various regions around the world. There is no single source; otherwise, you would keep searching and reading journals and papers. Therefore, we have established a think tank of global experts, which considers the future, as well as anticipates the situation and the technology that will be required. This think tank includes international experts who are working to develop innovative solutions using technology.

Another thing the IBCA is doing is highlighting the status of technologies used in wildlife conservation worldwide. So, on a single platform, all the latest technologies employed globally for wildlife conservation will be available to countries, researchers, scientists and practitioners. We aim to update this information annually. We keep it up to date. In this way, we are helping and supporting countries because technological tools are essential in this age.

Shashvat Singh:

When the IBCA is building the capacity of people from member nations, do you also focus on developing the skills of local communities, youth, and on how to utilise indigenous knowledge systems in conservation efforts?

Dr. S.P. Yadav:

Communities are an essential part of conservation. In fact, without community support, no conservation project or scheme can succeed. We discussed the landscape-level approach, where I mentioned that communities or people living in that landscape become an integral part of conservation. It is also very important to note that many poor people live in and around protected areas, or that poverty exists within protected areas. They have limited resources and employment opportunities, but lead a natural, self-sustaining lifestyle. Their needs are minimal. We need their support for conservation, and we require their traditional knowledge in wildlife conservation and in mitigating conflicts between wildlife and humans. From both perspectives, their support is crucial, and it is also important for governments and park managers to support them because their reliance on wildlife habitats for resources is significant.

Therefore, it is the duty of park managers and forest officers to ensure that their reliance on natural resources is minimised and that their needs are fulfilled through alternative sources. They require employment and the benefits of conservation must reach these communities substantially and directly, so that they become custodians of our wildlife, biodiversity and natural resources. Similarly, youth are extremely important. Times have changed significantly. There was no internet when we were young or when we were in school, but now there is an explosion of

information through technology and social media. As a result, young people are much more aware now. They are highly sensitive to environmental issues, climate change and plastics. We must utilise, equip and positively expand their knowledge base so that they become supporters, advocates and leaders of biodiversity and wildlife conservation. Currently, we are enhancing the capacity and skills of officers, training them on how to involve youths and local communities through eco-development committees. However, they are all integral parts of development. We cannot isolate them and focus only on wildlife conservation, as that is not feasible in today's world.

Shashvat Singh:

Moving to the most crucial question, which I would say is a major source of controversy and debate between developed and developing nations: finance. We all recognise it remains a significant challenge in conservation and climate action. What innovative financial models or partnerships is the IBCA exploring to ensure long-term sustainability?

Dr. S.P. Yadav:

The Govt of India established the IBCA with an initial support of only Rs 150 crore. However, we have provisions to generate resources through CSR funding and voluntary contributions from member countries. There is no joining or membership fee for these countries because, out of 95, more than 90 are low- or middle-income nations that are often in need of resources. As I mentioned, all developing countries require development, economic growth and employment opportunities. Usually, wildlife conservation is given lower priority by leadership or governments. You rightly highlighted the significant resource gap these countries need to conserve big cats. Therefore, resource generation has become a crucial pillar of the IBCA, with discussions with the World Bank now in their final stages.

We are also entering into an MoU with the Asian Development Bank. Now, there is carbon financing. We have partnered with Iora Foundation, an NGO that specialises in converting carbon into money. So, if you see, all these big cat habitats are very rich in biodiversity, have good forest cover and are fully protected. Therefore, there is incremental growth in carbon sequestration. If we can convert this carbon into a tradable form or into money, it can provide a very good source of income for these countries. We are working on this methodology. We have signed an MoU with Iora Foundation, which will, at no cost to the countries, go there to study their carbon stock, evaluate the incremental growth, and, based on that, convert the carbon into a tradable instrument to generate resources. We are developing innovative financing models and engaging with various donors and financial institutions to support these countries, which genuinely need funding for conservation and biodiversity.

Shashvat Singh:

Thank you for shedding light on the types of financial models the IBCA is considering for long-term sustainability. Moving to the next question, how do you see India's conservation policies contributing to our nationally determined contributions and the broader goal of nature-positive development that we champion?

Dr. S.P. Yadav:

Yes, India is certainly making an impact at the international level. You may have heard about the Mission LiFE launched by the Prime Minister of India, which states that an environmentally friendly lifestyle helps in combating climate change. It assists in mitigating global warming. India has several acts, such as the Environment Protection Act, the Wildlife Protection Act, and the Forest Conservation Act, which serve as role models for various countries. As per the Forest Conservation Act, no forest land can be diverted for non-forestry purposes unless approved by the central government. Although it is a small act, it has a significant impact on conservation, as forest land cannot be used arbitrarily.

There are rules and regulations, along with compensatory mechanisms, to prevent damage. If any forest land is to be used for non-forestry purposes like development activities, it must be compensated for, including measures like afforestation. Similarly, India has one of the finest Wildlife Protection Act in the world. All endangered animals are listed in Schedule One, while the remaining are in Schedule Two. Very few animals, considered vermins, may be hunted. Most animals in India are protected by this Act, and penalties for hunting Schedule One animals such as tigers, leopards, and lions are severe, with a minimum of 3 years and a maximum of 7 years imprisonment, along with property confiscation and fines.

Similarly, India has the Environment Protection Act. For any industry or developmental activities, environmental clearance is mandatory, which is issued after thorough scrutiny and screening by the government, along with certain conditions to help mitigate adverse impacts on the environment and forests. With this background and the support of institutions such as the National Biodiversity Authority, the National Tiger Conservation Authority, the Wildlife Institute of India, the Zoological Society of India, the Botanical Society of India, and the Forest Survey of India, there exists a solid framework. This serves as an example to other countries, and based on this support, India demonstrates its leadership role at the international level in biodiversity conservation and climate negotiations.

Shashvat Singh:

Would you agree that India's approach to big cat conservation provides a model for incorporating ecological resilience into national climate policies?

Dr. S.P. Yadav:

Yes, absolutely. In fact, let us take the example of India's Project Tiger. It was launched in 1973, and before 1969, tiger hunting was allowed. It is said that at the turn of the century, there were more than 10,000 tigers, although these figures are all estimates. Prior to 1969, tiger hunting was permitted, but it was banned that year. The Wildlife Protection Act was enacted in 1973, and Project Tiger was launched in 1973. The project initially started with nine reserves covering around 18,000 square kilometres. Today, we see significant growth in tiger reserves. There are now 58 reserves, and their total area has expanded from 18,000 to over 84,000 square kilometres. Once an area, sanctuary or national park is declared a tiger reserve, it receives the highest level of legal protection. Currently, India has around 1000 national parks

and sanctuaries designated as protected areas. In total, roughly 5% of the country's land area is fully protected and conserved in the name of wildlife. When we say 'fully protected and conserved', it means the forests are kept intact, natural regeneration occurs, and biodiversity is preserved within these zones. These efforts are intricately interconnected, grounded in India's principles of conservation, laws and ethos, and supported by the dedicated work of personnel from the state forest services and the Indian Forest Service who work tirelessly to maintain the nation's ecological security. In this way, India is demonstrating leadership in conservation.

Shashvat Singh:

Now, we will consider the future. Over the next five years, what are the main priorities of the IBCA, and how do they align with global frameworks such as the Paris Agreement and the Global Biodiversity Framework?

Dr. S.P. Yadav:

Currently, there are 95 Range Countries showing significant interest. However, for formal membership, they require proper approval from the government, such as cabinet approval, or in some cases, approval from the parliament. So far, 14 countries have already signed the framework agreement and officially became members of the IBCA, while three countries have opted for observer status. In many other countries, the process is underway and they are expected to join the IBCA platform very soon. Over the next five years, one of the key goals is to expand the organisation as much as possible, bringing the maximum number of countries onto the IBCA platform to foster collaboration. This expansion will include not only countries but also organisations working on conservation at a global level, as well as financial institutions, donors, NGOs and efforts focused on capacity building.

We organise capacity-building programmes on in situ basis. We previously organised a session at Kaziranga Tiger Reserve and National Park, where 44 members from 27 countries participated and benefited by observing and practising certain practices being deployed or followed there. Consequently, we plan to organise such capacity-building programmes annually and are exploring ways to expand this initiative so that the maximum number of people, including practitioners, policymakers and leaders, can be sensitized. Additionally, the GoI, in collaboration with the IBCA, has decided to organise an International Summit of Big Cat Range Countries in 2026. This summit aims to bring together forest ministers, policymakers, senior officers, practitioners, communities and youths from across the globe, and is likely to take place in the latter half of 2026.

The outcome of this summit will be the first-ever global big cat declaration, which has never happened before. Additionally, another key point we plan to pursue in the next five years is conducting SWOT analyses for all Range Countries. We need to identify their strengths, good points, bad points, and gaps in skills, capacity, technology or resources. Based on this scientific analysis, we aim to support these countries so they can succeed in big cat and biodiversity conservation. In short, this is our primary plan.

Besides this, we are highly active on social media, publishing a bimonthly Big Cats magazine that showcases best practices worldwide and provides information and updates on what is happening in different regions for stakeholders.

Shashvat Singh:

Do you also believe that public-private partnerships (PPPs) can be an essential method to conserve big cats?

Dr. S.P. Yadav:

In fact, there are different kinds of gaps, such as scale, capacity, technology and resources. PPPs can play a vital role that we need to explore. Depending on which companies and organisations can contribute and support, the impact can be significant. For example, in the reintroduction of cheetahs in India, the Indian Oil Corporation provided financial support, initially contributing around Rs 50 crore. This not only helps in creating awareness but also fosters a sense of ownership, as they take pride in their involvement. I believe PPPs in developing low and middle-income countries would be a highly worthwhile avenue to explore.

Shashvat Singh

Finally, Sir, what message would you like to send to policymakers, conservationists and youth about the importance of protecting biodiversity as a fundamental part of climate action?

Dr. S.P. Yadav:

If human beings want to live and sustain themselves, they need to protect biodiversity and wildlife for their survival. They do not do this solely for wildlife; by protecting and conserving wildlife, they ensure their own survival. This idea is deeply embedded in our cultural and social values. Because of this, the survival of each other is interconnected, and we must not forget the role of wildlife in the ecosystem. For example, consider honeybees. If honeybees disappear, pollination will be drastically reduced or cease altogether. This will negatively impact seed and fruit setting, among other things. Every creature on Earth, created by nature, has an important role, whether we understand it or not. It is a misconception that humans are the wisest and can control everything. Every creature has a role, and we should allow them to play it. Maintaining this balance is essential for our survival. I want to convey this message to the youth, future generations, and policymakers.

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Bangladesh-Pakistan Deepening Ties: Bangladesh Is Likely to Bear the Greater Cost

Swadesh Roy*

Introduction

In 1974, during the tenure of Bangladesh's founding president, Sheikh Mujibur Rahman, Bangladesh and Pakistan established diplomatic relations. To Bangladesh's pro-independence supporters, this was largely unwelcome. He moved forward against the opinion of those who had fought for freedom. On Bangladesh's soil, the wounds of war were still fresh; the blood on the bodies of the injured and the tears of mothers who had lost their children had not yet dried. Why, in such a moment, did Bangabandhu Sheikh Mujibur Rahman act so swiftly to normalise ties with Pakistan? There has been little research or discussion of this question in Bangladesh. One reason is that within a year of establishing diplomatic relations with Pakistan, Sheikh Mujib's period of rule ended; with his assassination, the character of Bangladesh's constitution was altered.

Many global powers were involved—directly or indirectly—in the change of government brought about by the assassination of President Sheikh Mujibur Rahman, but the beneficiary was Pakistan. Through that "success," Pakistan demonstrated that the segment of Bangladesh society still supporting it was not only loyal but also active—and remained steadfast in the same policy towards what had been East Pakistan (now Bangladesh) that Pakistan had pursued in 1971.

From 1974 to 2025—over fifty-one years—Bangladesh's politics have experienced many changes. Still, diplomatic relations with Pakistan were never broken. During these fifty-one years, the Awami League—the party that led the independence movement—was in power from June 1996 to September 2001, and again from 6 January 2009 until the morning of 5 August 2024—altogether a little over twenty years.

Pakistan's Use of "Soft Power": An Emptiness Beyond Cricket

Not only over those twenty years, but across the entire fifty-one years of diplomatic ties, one reality has been constant in Bangladesh: Pakistan has never seriously tried to build relationships with Bangladesh's mainstream public—that is, with ordinary people, including progressives. Even the progressive "soft powers" Pakistan does possess—music, theatre, literature—have never been proactively promoted in Bangladesh. The core reason is that these progressive strands, while not necessarily anti-state within Pakistan, stand opposed to the nurturing of "terrorism" that the state has long engaged in. Pakistan's own information minister acknowledged during the recent India–Pakistan "surgical strikes" episode that the state has had to foster terrorism, and, in his statement, even suggested it had to do so for

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the sake of other countries' interests. For that reason, Pakistan keeps these soft-power assets largely tucked away under the veil at home and never takes the initiative to bring them forward in Bangladesh.

There is, however, one form of soft power that Pakistan employs in Bangladesh—cricket, mainly around India–Pakistan matches. The reason is straightforward: such contests can evoke a sense of jingoism, which is then exploited to promote anti-India sentiment.

In reality, the anti-India attitude that exists in Bangladesh primarily supports Pakistan's strategy of fostering a fundamentalist or jihadist mindset. Therefore, cricket in Bangladesh is not used as soft power in the same way other countries deploy it—even Pakistani cricket, as soft power in the UAE, functions differently. Here, it is utilised to generate anti-India feelings—that is, to incite a militant mindset.

Over the past fifty-one years, Pakistan has neither established nor attempted to create open, direct, "people-to-people" connections with those in Bangladesh who support Bangladesh. Furthermore, there is an additional factor: if ordinary Bangladeshi citizens legally travel to Pakistan, they may later encounter difficulties in obtaining visas to Western countries—and indeed, to several other states as well.

Consequently, although Pakistan has enjoyed diplomatic privileges for fifty-one years, it has failed to build ties with most people from Bangladesh's mainstream educational culture and with the broad majority of pro-Bangladesh citizens.

Covert Financing and the Breeding of Terror

There is no public evidence that the Pakistani state has ever attempted to establish positive relations of the kind mentioned above. However, what is evident is this: during the roughly two years between 1972 and 1974—when Bangladesh and Pakistan had no diplomatic ties—and in the subsequent fifty-one years, Pakistan supported the growth of "terrorists" in Bangladesh in various forms. Immediately after independence—and indeed up to 1977—directly fostering religious fundamentalist terrorism in Bangladesh was challenging. Consequently, during that period, instead of religious fundamentalists, they promoted a form of terrorism in the name of extreme communism. At that time, an ultra-left leader, Abdul Haque, sent a letter via a Middle Eastern country to Pakistan's president, Zulfikar Ali Bhutto, asking for more funds and arms to overthrow the Sheikh Mujib government. That letter somehow reached the government of Bangladesh.

In effect, Pakistan began financing terrorism in Bangladesh through alternative routes: via an NGO controlled by a Middle Eastern state under the guise of assisting "stranded Pakistanis," and through covert money-laundering operations. Pakistani-affiliated Islamic fundamentalist organisations in India, with which Islamabad maintained good relations, were also exploited to transfer funds into Indian–Bangladeshi border areas. Often, the money was disguised as border "trade" or smuggling. Evidence of this includes the relatively stronger presence of the fundamentalist Jamaat-e-Islami in many Bangladesh–India border regions. From the 1980s

onwards, as fundamentalist organisations became increasingly public and extended their reach, their connections with Pakistan deepened. Consequently, after the upheavals of 2024, when Bangladesh–Pakistan ties were at their closest in fifty-one years, Pakistan emerged as the only trusted friend of Bangladesh's interim government. The foundation of friendship between these two nations—the Pakistani state and Bangladesh's interim administration—is rooted in the fundamentalist forces in both Pakistan and Bangladesh.

One further point is noteworthy: Jamaat-e-Islami is the main supporter of Bangladesh's current interim arrangement. Although the interim leader has stated his appointment was made by the student protesters of July '24, it is now evident to all that Jamaat-e-Islami Bangladesh holds significant influence over the present interim government. On October 20, 2025, Jamaat's secretary general told the student leaders of the July movement that Jamaat-e-Islami is "their father," and as sons, they should not disobey their father. The clear implication is that many of the student leaders involved in the July movement are, covertly, leaders of Jamaat's student wing, Shibir. While other Islamist militant groups in Bangladesh do have connections with Pakistan, since 1971, Jamaat-e-Islami Bangladesh has been Pakistan's "main friend" and partner.

Muslim Social Tradition versus Political Islam

As Bangladesh's friendship with Pakistan deepens, it will increasingly strengthen Jamaat-e-Islami. And Jamaat's empowerment could be damaging not only to other political parties and the state, but also to Bangladesh's Muslim community.

For thousands of years, the Muslim social mind in this land has evolved through a blend of the easy-going sahajiya ethos of riverine East Bengal and the devotional traditions of Sufi saints—including baul and bhatiyali songs, emphasising reliance and surrender. Generally, there are two main streams: one is the shrine-focused Ahl-e-Sunna tradition; the other is the majority, known simply as Sunni Muslims. Neither stream is inherently hardline. Their lived Islam is as much a way of practising and living as it is a creed; it has never been fundamentalist or linked to "political Islam." Jamaat-e-Islami, on the other hand, is rooted in Maududism—an ideology that completely embodies "political Islam." How perilous that form of "political Islam" can become with Pakistan's direct or indirect backing, and the shape it takes, was observed not only by the people of Bangladesh but by the entire world in 1971.

Therefore, in any current political calculation, if Bangladesh's interim arrangement develops closer ties with Pakistan and most of its benefits go to Jamaat-e-Islami, Bangladesh must consider—keeping 1971 clearly in mind—what form Jamaat will take. The political and social consequences of this growing Bangladesh–Pakistan relationship will depend on the clarity and honesty of that reflection. With the current flow of power through Pakistan's backing—from regime change to the rise of the interim arrangement—there has been, since this interim authority took office, not only the destruction of thousands of Hindu temples but also the demolition of thousands of Sufi shrines. It is not only Hindus

who have faced persecution and violence; shrine-centric singers and practitioners have also been murdered and mistreated.

This first sunrise clearly demonstrates how Jamaat-e-Islami, supported consistently by Pakistan, will threaten the majority of Bangladesh's mainstream Muslims. Hindus now must conduct their worship under Jamaat's supervision, rather than in their own freedom. In the temple, it is difficult to determine who holds more importance: the priest and the deity, or the leader of Jamaat-e-Islami. Hindus in groups are being coerced into joining Jamaat; they are compelled to declare that they have joined because it is a "good party." As Jamaat gains further strength through Pakistan, it is only natural that these impoverished Hindus pressed into Jamaat will be "converted" to Islam. Simultaneously, through Jamaat's money, pressure, and their own temptations, the shadow of small 'Jogendra Nath Mandals' is already visible.

The Presence of Militant Organisations

For over thirty years, Bangladesh's media have sporadically reported that Islamic militant organisations such as Jaish-e-Mohammed, Lashkar-e-Taiba, JMB, neo-JMB, Harkat-ul-Jihad, and Hizb ut-Tahrir are actively operating within Bangladesh. Even the "meticulous design" for regime change that Dr Yunus mentioned in the Clinton Foundation's remarks—under the banner of the July '24 movement—has been echoed by Lashkar-e-Taiba, which claimed to have played an active role in the fall of the Hasina government. Over time, it will become increasingly evident that Rohingya militant groups and jihadist units formed among stranded Pakistanis by Pakistan are also part of that "meticulous design."

More importantly, apart from Hizbut-Tahrir and the Brotherhood, the "headquarters" or regional headquarters of these Islamist militant organisations are based in Pakistan. If Bangladesh–Pakistan relations deepen—as current signs suggest—travel between the two countries will become more straightforward. Regardless of how easy that travel becomes, progressive Muslims—and even ordinary businesspeople—will visit Pakistan less frequently. Not only Western nations but also China are known to scrutinise travel to Pakistan when issuing visas. One reason is that a significant number of Uighur militants from China's Xinjiang receive training from Pakistani jihadists—even under army officers sympathetic to the militants.

Therefore, Bangladeshi students who are not militants and who wish to study in the West—or even in China, Malaysia, Thailand, or India—will be cautious about, or avoid, travelling to Pakistan. (Already, under the banner of "restriction," many countries have effectively limited visas for Bangladeshis.) In contrast, apart from the militant groups already mentioned, there are many more active militant organisations in Bangladesh — their total number, according to various media reports over time, exceeds a hundred. The members of these groups, as well as students from various educational institutions run by their leaders, will be the ones travelling to Pakistan in greater numbers and more frequently.

From this, it is clear: if Bangladesh–Pakistan relations strengthen, the movement of Bangladeshi militants — and those who might become militants

in the future — to Pakistan will rise. Simultaneously, without proper monitoring, high-level operatives or trainers from Pakistan's militant groups could enter Bangladesh freely.

Nor are their numbers small. In the final six or seven years of her tenure, Sheikh Hasina adopted a policy of somewhat improved relations with Pakistan; as a result, friends of Pakistan gained influence within policymaking and elsewhere. Education policy and much else were shaped according to their preferences. The ideas and people rooted in the spirit of the Bangladeshi Liberation War were sidelined. Thus, while their numbers were already growing quietly, over the last seven years they have increased further—something Sheikh Hasina herself learned most vividly.

If, on the foundation she has established, the current interim arrangement—ostensibly aimed at fostering deep friendship with Pakistan—directly supplies fertiliser, seed, and water, the outcome is foreseeable. Just as Pakistan is described as a jihadist "breeding ground" or "cocoon," if Bangladesh follows that path, it will be challenging to prevent. Soon, in South Asia, Western powers might replace their current enthusiasm for Gen-Z transformations with branding Bangladesh as another jihadist "breeding ground."

Economics and Jihadism: They Do Not Coexist

The more Bangladesh trends towards becoming a jihadist "cocoon," the worse its economy will become. Extremism and a healthy economy cannot coexist. Over the past year alone, Bangladesh's GDP growth has fallen from 6.1 to 3.76 per cent. A year ago, Bangladesh's growth was comparable to India's and China's; now, its GDP resembles that of its close neighbour, Pakistan. According to the IMF's October 15 forecast, Bangladesh's growth may decline to 3.76%, while Pakistan's could drop to 3.75%.

In a country affected by extremism, it is generally impossible in today's globalised era to steer the economy in the right direction. When a country becomes a "breeding ground" for militants, foreign investment declines or halts. Note that even during the global recession of 2009, Bangladesh's economy grew at a healthy pace. However, after the jihadist attack on Holey Artisan on 1 July 2016, the government never regained that momentum.

The attack revealed a terrifying aspect of Bangladesh's militancy. In the past, militants were mainly from lower social classes. However, in the Holey Artisan attack—similar to Western jihadist assaults, Pakistani jihadist groups, or Uighur militant factions—the attackers included the upper class, those with Western education, and students and teachers from lower-class religious schools. Although financial backing and state influence have been used to shield many upper-class, Western-educated individuals involved in the attack—and some have even been portrayed as "heroes" through various media—time will expose all of this. For now, they remain active and influential under different names; no obstacle stands in their way.

In this situation, it is unrealistic to expect foreigners to invest in manufacturing plants in Bangladesh. The past year has shown no indication to the contrary. After August 5, 2024, Pakistani-nurtured militants in Bangladesh have, in line with

"meticulous design maps," destroyed various industrial facilities—leaving even domestic investors hesitant. As a result, not only because of the tariffs announced by Trump but also due to this hesitation, many industrialists are shifting from manufacturing to trading.

Where militants are present, sabotage and even anarchy follow; as a result, foreign buyers are becoming increasingly reluctant to place orders. In statements following recent sabotage incidents, the Bangladesh Chambers and the Garment Manufacturers' Association have clearly stated that foreign buyers are hesitant, leading to a decline in orders across Bangladesh's apparel sectors, including footwear.

As friendship with Pakistan allows militants more freedom to expand, foreign investors already present in the country will not only hesitate but also encounter difficulties; often, in such situations, investments in countries affected by jihadism are withdrawn in waves. Japan and several other countries are already moving towards withdrawal. Even a significant IMF-related investment in the metro rail may be lost if the funds are not utilised by 2025. The government, for its part, lacks either the courage or the capacity to undertake such substantial investments.

Meanwhile, many domestic industrialists have already entered the trading market. In manufacturing, true profits usually take about twenty-five years to mature. In a country affected by extremism, a quarter-century of stability is never guaranteed. Sheikh Hasina's administration maintained stability for sixteen years, but in the last five, Pakistani-linked militant auxiliaries surrounded her. The economy not only stalled but also suffered from mismanagement. When an economy slips into mismanagement, some funds are diverted to militants—the clearest example being Pakistan. That process had already started in Bangladesh, allowing the "meticulously designed" militants to grow stronger. In the end, Sheikh Hasina fell to the militants.

For these reasons, Bangladesh's industrialists do not expect quick stability. What depresses them further is the friendship with Pakistan. Business leaders can sense early—and quickly—when the climate begins turning adverse. Many now believe that, aside from trading, industry will gradually decline. As the economic trend falls rapidly, purchasing power will diminish; even the current level of trade will contract quickly if the current trajectory persists.

Border Realities: Teknaf and the Chittagong Hill Tracts

Two border regions are currently problematic: the Teknaf frontier with Myanmar and the Chittagong Hill Tracts, where Bangladesh borders both India and Myanmar. The government of Bangladesh has acknowledged that the Myanmar border at Teknaf is now largely under the control of the Arakan Army. In practice, this is true: they abduct Bangladeshis, including fishermen, at will; they also smuggle. As a result, even Bangladeshi boats and fishing activities in the area have come to a halt.

More seriously: among the over one million Rohingya refugees in Bangladesh, there are two terrorist groups—the Arakan Rohingya Salvation Army (ARSA) and the Rohingya "Solidarity" Army (ROS). It is sometimes said ARSA has weakened

and ROS has grown stronger; in reality, they are "two parts of one garlic." According to local sources, ARSA has long enjoyed the support of Pakistani jihadists and other organisations; the same is said of ROS. These two militant groups carry out attacks on Myanmar's army as well as on the Arakan Army. Some of them were seen during the July "movement"; the present government even arrested one of them. Many leaders of the post-July party formation are also Rohingya.

Myanmar is now a focal point in a significant geopolitical struggle. Nonetheless, both China and India have tangible interests there; America is interested in the country's rare earths. The two ports or zones, around which Chinese and Indian interests and interactions revolve, are located on the Bangladesh side, situated opposite areas where ARSA and ROS—supported by Pakistan—are based. Their current numbers are not large; however, as foreign aid to the Rohingya camps diminishes and Bangladesh's capacity to assist wanes, the number of disillusioned, hungry young Rohingya refugees is increasing. These youths are prime recruits for militant groups. With them, these groups can rapidly grow—and if Pakistani jihadist networks or Pakistan itself, under other guises, supply arms (especially through maritime smuggling, which this zone facilitates), these militants can quickly expand their ranks and confront the Buddhist Myanmar army. Since the Bangladesh government has largely lost control of this area, it is likely to exploit the opportunity.

When such activities embed themselves in the Rohingya militant circles and camps, the repercussions will not be confined to Myanmar alone; India will feel the impact as a neighbouring country, and China will suffer indirectly. China's gas pipelines, EPZs, and its financed seaport projects will face threats. Similar indications, in a different form, are evident in the hill districts. Among the Bengali "settlers," some groups are fostering a militant stance against the hill peoples of the Jum tradition. For electoral gain, Jamaat-e-Islami will undoubtedly "pour some oil" here. Actions by militant organisations will ultimately benefit Jamaat at the ballot box—not necessarily the BNP or the Awami League. On these borders with India and Myanmar, Jamaat—Pakistan's collaborator—will bolster one or more obscure militant groups. That is their strategy, and Pakistan's.

Hence, the conflict in the Hill Tracts will undo the peace that many Jum communities have maintained for over thirty years. Pakistan-supported groups and their allies, seizing a strategic moment, will establish a foothold among the Bengali settlers—and in doing so, not only unite the Jum peoples but also drive them toward resistance.

Whenever such a situation occurs on the Myanmar-India border, Bangladesh will see what the rest of the world observes elsewhere. These two neighbours will not be satisfied with defending their frontiers solely through "soft power." If one side builds up "hard power," the other will be forced to respond accordingly. This "hard power" along the borders will drive Bangladesh towards an arms race.

Pakistan cannot provide financial aid to Bangladesh in such a scenario. However, it will insist on its preferred strategy—reducing public welfare and living standards to finance weapons

purchases—and will push Bangladesh towards that course and reality. Even during Sheikh Hasina's leadership, Bangladesh bought many unnecessary weapons, undermining human development. If, with an economy less than half the strength of her tenure, Bangladesh falls into an even larger arms race, the consequences will be disastrous for both the economy and geopolitics. All of this will stem from the actions of Pakistan's allies along the borders.

Along the frontiers of Satkhira, Rajshahi, and elsewhere, Pakistan's collaborators, Jamaat-e-Islami, are relatively strong. There is also the largely unsecured border along the Mangrove forests of the Sundarbans—an important route for trafficking humans and various other items. If Pakistani militants, together with Bangladeshi militants, expand trafficking and other operations along this corridor, it could become a serious source of future harm for Bangladesh. Overall, the evidence indicates that Bangladesh–Pakistan relations will contribute to political instability in Bangladesh, foster a jihadist breeding ground, provoke conflicts along multiple borders, and, most importantly, open a route for the trafficking of weapons and many other contraband. Friendship with a "rogue state" like Pakistan cannot bring more than this.

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