SOUTH ASIA DISCUSSION PAPERS

INDIA AND SOUTH ASIA: ADDRESSING DEFINING CHALLENGES OF THE CENTURY

Editors
Amitendu Palit
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NUS National University of Singapore | ISAS Institute of South Asian Studies

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The Institute seeks to promote understanding of this vital region of the world, and to communicate knowledge and insights about it to policymakers, the business community, academia and civil society, in Singapore and beyond.

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Introduction: Framing the Century's 'Defining Challenges' for India and South Asia

Amitendu Palit and Saeeduddin Faridi

Since the beginning of the current century, 'defining challenges' have evolved in response to the changing dynamics of regional and international affairs as well as specific domestic developments. In South Asia, the states are grappling with the implications of the changing global order and ensuing systematic transformations while struggling to cope with structural problems of low and uneven development, occasional political instabilities arising from deep-rooted social unrest and rising incidence of extreme weather events and climate catastrophes. The intersection of persistent domestic problems, some of which are inherently structural, and a rapidly shifting global policy landscape has generated a new set of challenges for South Asia that will occupy regional policymaking in the foreseeable future.

The shifts occur with the Global North re-evaluating the benefits from economic globalisation and liberal trade policies.

The global order is transforming from geo-economic fragmentation driven by weaponisation of trade, rise of prominent state-driven industrial policies and economic nationalism.[1] The shifts occur with the Global North re-evaluating the benefits from economic globalisation and liberal trade policies. The turnaround is most visible in the United States (US) and President Donald Trump's aggressive imposition of tariffs and other trade restrictions while bilaterally engaging with countries on trade with scant regard to regional and multilateral rules-based frameworks.[2] For most South Asian economies, the US' policies have presented greater challenges for retaining market access for exports and safeguarding domestic incomes and livelihoods.

The evolving global dynamics are further complicated by the US-China rivalry precipitating fragmentation of the world order and its reorganisation among countries strategically allied to both powers and

1 "A Shifting Global Order: The Structural Forces Redefining Trade and Global Supply Chains", Event Recap, Johns Hopkins University School of Advanced International Studies (SAIS), 19 May 2025, https://sais.jhu.edu/news-press/event-recap/shifting-global-order-structural-forces-redefining-trade-and-global-supply.

2 Tamarron Austin, "A New Era of Protectionism and What It Could Mean for the Future Landscape of International Trade", *World Cultures Explainer*, Center for International Affairs and World Cultures, Northeastern University, Spring 2025, https://cssh.northeastern.edu/internationalcenter/wp-content/uploads/sites/41/2025/07/CIAWC-World-Cultures-Explainer-Tamarron-Austin.pdf.

those seeking to hedge and stay neutral. The resultant country coalitions enhance multipolarity and create new spheres of political identities and competitive rulemaking. This is especially visible through repositioning of global supply chains. Ongoing military hostilities, such as those in Ukraine and the Gaza have further widened global geopolitical rifts and diverted significant material capabilities towards expanding military budgets.[3] Resilience of the global order is being heavily tested with current global rules-based frameworks unable to end the hostilities. For a conflict-prone region like South Asia, this is not an encouraging sign.

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Regional policymakers are confronted with the challenging task of crafting new responses to external developments that are not unaligned with domestic priorities. Tackling economic, environmental and social security issues is paramount for a region hard-pressed to create new jobs, preserve natural resources and sustain livelihoods and communities affected by climate disasters.

A cross-cutting theme in the discussion on imperatives for regional policy priority is addressing the impact of climate change. The region is already reeling from climate shocks and experiencing a new normal marked by intensifying heat waves, floods, glacial lake outburst, cyclones and droughts.[4] The high incidence of extreme weather events calls for urgent action on both mitigation and adaptation involving efforts to minimise damages from weather-induced catastrophes and progressive decarbonisation of emission-intensive industries. Lack of adequate funds, especially from multilateral sources, and insufficient capacities for tackling the problems remain persistent challenges. The flow of finance from the Global North to the Global South remains woefully inadequate and a significant point of contention in climate negotiations.[5] Cooperative mechanisms like the Quadrilateral Security Dialogue (Quad) [grouping of Australia, India, Japan and the US] are yet to deliver lasting results in the climate domain. On the other hand, trade measures like

3 European Parliamentary Research Service, "EU Member States' defence budgets", Brussels: European Parliament, 2025, https://www.europarl.europa.eu/RegData/etudes/ATAG/2025/772846/EPRS_ATA(2025)772846_EN.pdf.

4 The World Bank, "Climate and Development in South Asia", https://www.worldbank.org/en/region/sar/brief/integrating-climate-and-development-in-south-asia/integrating-climate-and-development-in-south-asia-region.

5 Ritu Basu and Cheng Hoon Lim, "Explainer: How Asia Can Unlock $800 Billion of Climate Financing", *International Monetary Fund Blog*, 29 January 2024, https://www.imf.org/en/Blogs/Articles/2024/01/29/explainer-how-asia-can-unlock-800-billion-of-climate-financing.

also rewriting trade rules at the intersection of decarbonisation and trade. Climate change occupies a critical within policy making.

The discussions papers brought together in this South Asia Discussion Papers series are some of those that were presented during a conference organised by the Institute of South Asian Studies in the National University of Singapore in New Delhi, India, on 29 November 2024. The theme of the conference was 'India and South Asia: Addressing Defining Challenges of the Century'. These papers reflected on issues against the background of the substantive context mentioned above.

Updated and revised in the light of the developments that have followed since then, the papers highlight a remarkable set of enlightened perspectives on South Asia and the challenges it faces in the 21st century. A thematic ideation of the subjects of the conference connecting to the key thoughts in the papers follows.

Theme 1: Climate Change and Sustainable Development

The challenge to achieve sustainability complicates with global geopolitical rivalries impacting various issues of climate management, including accessing renewables and adopting electric vehicles.

South Asia has emerged as a climate change hotspot with the burgeoning population of the region aggravating its social and economic insecurities from climate change.[6] While this raises several immediate challenges with respect to disaster management, public health rehabilitation and reconstruction, it also impacts the development pathways for the states in the region. The challenge to achieve sustainability complicates with global geopolitical rivalries impacting various issues of climate management, including accessing renewables and adopting electric vehicles.

A significant part of these issues and their long-term implications were addressed by M Rajeshwar Rao, former Deputy Governor of the Reserve Bank of India, during his keynote address on 'Climate Risk Mitigation: Building a Robust Ecosystem for Sustainable Finance' during the conference. Included as a paper in this volume, the address highlighted the risks for India's financial system caused by climate change. Existing systems and frameworks are adapting to the challenges emerging from

6 Usaid Siddiqui, "What makes South Asia so vulnerable to climate change?", *Al Jazeera*, 8 July 2023, https://www.aljazeera.com/news/2023/7/8/what-makes-south-asia-so-vulnerable-to-climate-change.

the climate crisis. The financial system is critical in shaping India's national response to the climate shocks, and it is being aligned accordingly through proactive efforts by India's central bank for assessing risks and building a robust framework for sustainable finance. While highlighting issues for urgent financing of mitigation and adaptation, the author also proposes several solutions to effectively leverage financial resources.

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The critical intersection of development and climate change is explored by Purnamita Dasgupta in her paper titled 'Climate Change and Sustainable Development: Multiple Realities and Solutions for South Asia'. The paper demonstrates the compounding of risks generated by climate change in policy and public goods delivery domains such as agriculture, health, and labour productivity, in the context of South Asia. The analysis underscores the need for integrated action where climate is seen in tandem with other sustainability and developmental issues. The chapter puts forth the trinity of 'equity, climate resilience and development' to push forward social progress in the region while recognising the unfortunate reality of limitations in financing.

Archana Chaudhary closely assesses climate risks and associated costs in her chapter titled 'Rising Costs of Climate Change: Global Risks, Economic Impacts and South Asia's Vulnerabilities'. The compounding effects of climate change and the commonality of challenges faced by the South Asian countries is mapped in detail leading to the identification of the problem as a 'polycrisis'. The discussion draws on the historical trajectory of global climate negotiations and rules frameworks distinguishing developing and developed countries and contextualises targets and commitments proposed by the South Asian economies. Against the backdrop of the complicated international policy landscape, dynamics of self-reliance are unpacked by the author, and some practical recommendations conclude this discussion.

One of the most critical challenges facing sustainability in South Asia is transitioning to clean sources of energy. Kaushik Deb and Suyash Nandgaonkar, in their chapter titled 'State of Energy and Climate in India', give a comprehensive outlook on India's climate and energy landscape. The chapter takes stock of historical emissions and how the changing structural dynamics of the Indian economy will drive its energy consumption in the decades to come. The twin objectives of decarbonising the energy sector and ensuring energy security are currently being pursued by the government while balancing climate commitments and developmental goals.

Theme 2: Power Competition and Geoeconomics

The engagements are driven by regional security interests premised on military and defence ties along with efforts to safeguard critical supply chains and accessing strategic resources and large markets.

The substantive discussion on risks from climate change, challenges in obtaining affordable climate finance, decarbonisation and the lack of supportive rules-based frameworks could not possibly overlook the overarching context of global power competition and the strategic value of the South Asian region. Global major powers – the US, the EU and China – as well as other prominent global economies and middle powers (for example, Japan, Australia, the United Kingdom, Russia and Saudi Arabia) have been actively engaging with India and the other countries of South Asia. The engagements are driven by regional security interests premised on military and defence ties along with efforts to safeguard critical supply chains and accessing strategic resources and large markets.

As the region's largest economy, as well as the one with noticeable strategic heft, India figures in various multi-country initiatives structured on common geo-economic interests (for example, the Indo-Pacific Economic Framework, the Supply Chain Resilience Initiative, the Quad and the Minerals Security Partnership). It also works with some other South Asian countries in prominent plurilateral initiatives (the BRICS,[7] Shanghai Cooperation Organization and the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation). These various frameworks are working on advancing collective securities of the members by advancing strategic cooperation, including minimising disruptions from breakdowns in essential supply chains and economic coercion arising from imbalance in global allocation of critical resources.

Gopal Nadadur's paper 'Geoeconomics and Manufacturing Supply Chains: The Case of Pharmaceuticals' examines how India's industrial supply chains feature within this new geo-economic landscape. Both developed countries, as well as those from the Global South, are drafting policies aiming to posit themselves as geo-economically attractive locations for hosting various parts of critical supply chains. The pharmaceutical sector, whose prospects impact economic security in India is various respects, is one where many countries would want

7 The BRICS is a group formed by 11 countries: Brazil, Russia, India, China, South Africa, Saudi Arabia, Egypt, the United Arab Emirates, Ethiopia, Indonesia and Iran. It serves as a political and diplomatic coordination forum for countries from the Global South and for coordination in the most diverse areas. See https://brics.br/en/about-the-brics.

to have the authority to 'control' supply chains. The paper studies how India can leverage its existing expansive manufacturing base to fulfil its bioeconomy ambitions. The domestic incentive structures in India and the regional and international drivers of supply chains are important points of analysis in the paper. As the author argues, while the ground may be fertile for greater growth and expansion in the sector, structural challenges such as high sourcing dependence on China, less competitive active pharmaceutical ingredients manufacturing in India, and unpredictability of global trade restrictive measures can restrict efforts to significantly position large segments of the supply chain in India.

Theme 3: Security, Trade and Connectivity

Global trade has increasingly become 'managed' with states encouraging more trade with 'like-minded' partners. As a result, trade flows are beginning to concentrate more among politically aligned blocs of countries.[8] Similar trends are visible for global investments too.

Global trade has increasingly become 'managed' with states encouraging more trade with 'like-minded' partners.

India and South Asia are variously engaged in and impacted by these global shifts in trade, investments and their preferential options for regional connectivity. As India works on staying engaged with a fast-changing global order in line with its strategic priorities, it is important to understand whether these shifts in trade will enhance prospects of India's external economic engagement.

In her paper, titled 'Security-centric Vision of Trade and Connectivity: Connecting the Dots for India', R V Anuradha underlines the growing belief among countries that trade rules need rewriting to overcome the inadequacy of existing policy spaces. This is coupled with growing disillusionment with economic globalisation, pivoting away from the liberal trade regime and security imperatives operating within this space in the form of scrutiny on foreign investments. The paper draws on technology as a domain of competition between China and the US to demonstrate how security dimensions operate in the trade space. Highlighting India's growing prominence on the world stage gives an important lens to its trade relations with partners like the US and China

8 Sung Cho and Simona Gambarini, "Trade Routes Realigned: From Integration to Fragmentation", Goldman Sachs Asset Management, 23 October 2025, https://am.gs.com/en-sg/institutions/insights/article/2024/trade-routes-realigned-from-integration-to-fragmentation.

and the kind of role it can play to preserve its place as a rule maker. These are critical insights to understand how geopolitical conditioning of global trade and capital flows will influence India's economic prospects.

Final Thoughts

The enormity of the challenge and its policy salience is reflected in the proportionally larger number of papers in this compendium that address the issue.

While geo-economic power competition and security-centric reorganisation of trade and supply chains have huge strategic and economic impacts for South Asia, the ramifications from climate change are immediate and visible. Loss of resources and livelihoods, as well as lives from climate disasters, have assumed gigantic proportions in South Asia. Tackling climate will perhaps be the most significant of 21st century challenges in the region. The enormity of the challenge and its policy salience is reflected in the proportionally larger number of papers in this compendium that address the issue.

In context to the imperatives of this challenge, the region will need to navigate the negative externalities and downsides of global major power rivalry and internal structural deficits. The next few years of the current decade will indicate whether the region has the wherewithal to cope with this unprecedented complexity.

Climate Risk Mitigation: Building a Robust Ecosystem for Sustainable Finance

M Rajeshwar Rao

As per the latest report from the Copernicus Climate Change Service, the year 2024 would be the warmest year in the ERA5 reanalysis dataset, going back to 1940.[1] This was also estimated to be the second-warmest October globally, after October 2023, with the average temperatures 1.65ºC above the pre-industrial level, while also marking it the 15th month in a 16-month period where average temperatures were above the 1.5ºC threshold set by the Paris Agreement. Thus, the writing on the wall seems to tell us that unless we collectively take strong action, a grim future lies ahead. The recent tragic events, be it in Valencia (Spain), Wayanad (Kerala, India) or back-to-back hurricanes in the United States (US), are stark reminders of the perils of climate change that the world at large is exposed to. It impacts our day-to-day lives in one form or another, be it through heavy rainfall, flash floods, cyclones, droughts, melting of glaciers, loss of biodiversity, and that too with increased frequency and severity. There can be no doubt, therefore, that climate change is going to be a major risk for the financial system, economy and society at large, with risks of severe catastrophic events putting at stake our very survival.

There can be no doubt, therefore, that climate change is going to be a major risk for the financial system, economy and society at large, with risks of severe catastrophic events putting at stake our very survival.

The financial system not only needs to prepare and equip itself for the present and future impacts arising from climate change but should also play a catalytic role by overcoming the consequent challenges that arise. The biggest challenge faced by us and the emerging markets and developing economies (EMDEs) is the lack of adequate financing for the development of sustainable technologies and requisite infrastructure to mitigate and adapt to climate change and build a robust, sustainable financial system. India looks to be particularly vulnerable to climate change given its geographic location. It is estimated that by the year 2100, climate change could lead to an annual gross domestic product (GDP) loss of three per cent to 10 per cent.[2]

1 "The Year 2024 Set to End as the Warmest on Record", *Copernicus Climate Change Service* commentary, January 2025, https://climate.copernicus.eu/year-2024-set-end-warmest-record.

2 Reserve Bank of India, *Report on Currency and Finance*, Report, 3 May 2023, https://rbi.org.in/Scripts/AnnualPublications.aspx?head=Report+on+Currency+and+Finance.

Climate Change Risks and its Impact on the Financial System

There are essentially two types of risks emanating from climate change that we need to address: physical and transition risks. An important consideration in this regard is also adaptation and related risks and measures.

Physical risks stem from both gradual and sudden climate impacts, such as natural disasters, affecting real assets and financial instruments. These risks cause direct damage to assets, leading to loan losses and collateral damage, as well as indirect costs, including business disruptions, capital replacement and supply chain issues. These risks can affect trade, fiscal policy, monetary policy and financial stability, requiring ongoing assessment. Estimating loan losses from physical risks is difficult due to the lack of historical data on such losses, as financial institutions have not tracked them. Even the available data is of limited use due to the changing frequency, intensity and location of physical events, making projections based on past data a bit risky. Such data on loan losses is important for financial institutions as it impacts credit risk, including the probability of default and loss given default.

It creates uncertainty for firms and investors, which may further lead to financial risks, with its resultant impact on financial stability.

Transition risks arise from efforts to mitigate climate change. These risks arise from the need for transition by the firms and economies as they strive to achieve their net-zero targets, which can be disruptive. It could be a result of adaptation to low-carbon technologies, as well as a change in consumer behaviour, investor preferences about investments in specific sectors. It can also be a fallout of climate-related regulations such as carbon pricing and taxes, transparency requirements, products and service regulations. Thus, the transition risk emerges because of a disconnect arising from the expectations of various economic factors and could lead to rapid economic adjustment costs in a broad range of sectors. It creates uncertainty for firms and investors, which may further lead to financial risks, with its resultant impact on financial stability.

While transitioning is crucial, we cannot overlook the immediate impact of climate events, which means that we also need to look at adaptation measures, which currently appear to be a missing link as far as climate strategies are concerned. Adaptation involves responding to climate event impacts, which steadily deteriorate the environmental conditions essential for daily living, such as access to water, energy, air quality and tolerable working temperatures. These conditions can be disrupted by

short-term shocks like storms, floods and wildfires, which have abrupt and devastating effects. We need to look at strategies that minimise loss and damage and adaptation financing is likely to be critical for building economic resilience and fostering sustainable development.

Climate-related risks may also lead to macroeconomic impact on households, companies and sovereigns, affecting consumption, production and investment patterns. Given their exposures to firms, whether in the form of credit or investments, as well as their own operations, these risks impact the financial institutions through traditional risk categories of credit, market, liquidity and operational risks. These losses may get amplified through interconnectedness among the financial sector players and between the financial and non-financial sectors, as well as within the non-financial sector. The inter-linkages between physical risk and transition risk may also act as a particular source for non-linear risk impacting financial stability. These risks may also be magnified through cross-border trade and production interdependencies.[3]

These risks may also be magnified through cross-border trade and production interdependencies.

Regulatory Response and Challenges

While there is some debate on whether or not climate change is part of a mandate for a central bank, the fact that it has a bearing on both price and financial stability means that there is a need for a regulatory response to risks arising from climate change. The impact on the financial system and economy arising from climate change is dependent on the extent of their exposures to these risks and the mitigation measures that are in place. The dilemma and challenge faced by the regulators is to not only put in place an enabling ecosystem from a prudential perspective but also act as an enabler and facilitator for orderly and sustainable development of the financial system and economy. Given the significant inter-sectoral dependencies, the mitigation of climate change risks not only requires individual sectoral response from regulators, but also inter-regulatory coordination.

The Reserve Bank of India (RBI) has been proactive in its resolve to assess and mitigate the climate change risks that may impact the financial

3 An instance would be the proposed Carbon Border Adjustment Mechanism of the European Union.

system. Over the last few years, we have taken several incremental measures in this direction. It started with the setting up of a dedicated group within the RBI to assess climate change risks and foster a robust ecosystem for sustainable finance. This was followed by the release of a survey on climate risk and sustainable finance covering 34 scheduled commercial banks,[4] a discussion paper on *Climate Risk and Sustainable Finance*[5] and the release of a framework on green deposits.[6] The RBI has been actively engaging with various stakeholders in the financial sector on the integration of climate change risks in the traditional risk management framework and on climate scenario analysis to identify vulnerabilities in their balance sheets. It is also taking steps to ensure the adequate flow of credit for mitigation purposes and addressing gaps in capabilities for measuring and managing climate-related financial risks.

The disclosure framework aims to equip regulated entities with the tools to identify and develop competencies that mitigate climate change risks, without restricting lending to any particular sector or industry.

One of the measures for setting the expectations and nudging climate change risk mitigation actions within the ecosystem is by prescribing climate disclosure standards. Global standard-setting bodies such as the International Sustainability Standards Board have been a pioneer in this area, and most jurisdictions, including India, have been making attempts to calibrate their respective disclosures with its prescriptions, keeping in view the essentiality of their common but differentiated responsibilities. The RBI had issued a draft disclosure framework for climate-related financial risks for public consultation.[7] Based on the feedback received, the final guidelines are likely to be released shortly. The disclosure framework aims to equip regulated entities with the tools to identify and develop competencies that mitigate climate change risks, without restricting lending to any particular sector or industry.

Though we may have a broad understanding, we are yet to reach the stage where we can comprehensively assess the risks arising from climate change. The major challenge for a true assessment of climate change

4 Reserve Bank of India, "Report of the Survey on Climate Risk and Sustainable Finance", Mumbai: Reserve Bank of India, 27 July 2022, https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage&ID=1215.

5 Reserve Bank of India, "Discussion Paper on Climate Risk and Sustainable Finance", Mumbai: Department of Regulation, Reserve Bank of India, 2022, https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/CLIMATERIS46CEE62999A4424BB731066765009961.PDF.

6 Reserve Bank of India, "Framework for Acceptance of Green Deposits", Press Release, Mumbai: Reserve Bank of India, 11 April 2023, https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=12487&Mode=0

7 Reserve Bank of India, "RBI invites comments on the 'Draft Disclosure framework on Climate-related. Financial Risks, 2024'", Press Release, Mumbai: Reserve Bank of India, 28 February 2024, https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=57408.

risks is the availability of required data.[8] Climate data is characterised by a lack of uniform methodology, fragmentation in accessibility, lack of uniformity in publication of data and differences in metrics, units and formats. There is a lack of actual historical loan loss data related to climate risks, hazard data encompassing historical and future forecasts of occurrences of climate events and sectoral benchmarks for transition to net zero. Currently, there is no set practice among financial institutions of labelling loan assets which have gone bad based on any climate risk event. This limits the availability of realistic loan loss data for the integration of climate-related risks into traditional risk management models to estimate the probability of default. It also inhibits the financial institutions from carrying out various simulations and scenario analysis exercises to arrive at realistic future loss estimations.

There is a lack of actual historical loan loss data related to climate risks, hazard data encompassing historical and future forecasts of occurrences of climate events and sectoral benchmarks for transition to net zero.

Consequently, various approximation methods/data sets are being used at this point to arrive at loan loss data and measure expected future losses. When we consider physical risk and particularly the hazard data, there is a need for India-specific data that can be based on a globally accepted range of scenarios. Having said that, the scenarios provided by the Network for Greening the Financial System and Intergovernmental Panel for Climate Change serve as a good starting point to derive India-specific results. In the case of transition risks, there is a gap in terms of the availability of sectoral transition benchmarks that can be used by financial institutions to gauge the relative transition risks of the firms. Absence of a definitive taxonomy at the national level is also a constraint to determining which sectors need to transition, along with an indicative road map for the same. Further, the measurements of Scope 1, 2 and 3 emissions also remain a work in progress.

The Scope 3 emissions essentially pertain to upstream and downstream emissions in the value chain for a firm. It should be the endeavour of each of the players in the value chain to take care of his/her respective Scope 1 and Scope 2 emissions so that issues relating to Scope 3 are automatically taken care of. It is from this perspective that climate risk-related disclosures become very important, and, hence, the need for

8 The Network for Greening for the Financial System's Final report on bridging data gaps highlights availability (for example, coverage, granularity, accessibility), reliability (for example, quality, auditability, transparency) and comparability, as issues in climate-related data. The Network for Greening for the Financial System, "Final report on bridging data gaps", 2022, https://www.ngfs.net/system/files/import/ngfs/medias/documents/final_report_on_bridging_data_gaps.pdf.

the financial system to capture the respective Scope 1 and Scope 2 emissions. This will not only motivate firms towards assessment of their own climate change-related risks but also prepare the system at large to ward off any systemic issues going forward.

The RBI intends to address the gaps in climate data availability with the creation of the data repository, namely, the Reserve Bank-Climate Risk Information System, which was announced by the Governor on 9 October 2024.[9] It is envisaged to consist of two parts. The first, a web-based directory listing various data sources (meteorological, geospatial and more), which will be publicly accessible on the RBI's website. Second, a data portal comprises datasets (processed data in standardised formats). Access to this data portal will be made available to the regulated entities in a phased manner.

Issues and Challenges with Sustainable Finance

The world and India, in particular, require a considerable amount of funding to achieve the respective net-zero targets.

Here, let me flag a challenge in augmenting the scope of sustainable finance. The world and India, in particular, require a considerable amount of funding to achieve the respective net-zero targets. Climate change was a topic of heated debate, particularly about the availability of adequate climate-related finance, at the recently concluded Conference of the Parties (COP) 29 in Baku, Azerbaijan, which highlighted two issues: first, climate-related finance still gets negotiated at international fora and second, the EMDEs' priorities are still not aligned with those of the developed nations. Though the agreement proposed to triple the climate finance for the EMDEs from the previous goal of US$100 billion (S$129 billion) to US$300 billion (S$387 billion) annually by 2035, it fell short of the EMDEs' expectations. India had committed to COP26, its *Panchamrit* goals (Nationally Determined Contributions). It is estimated that the funding requirement to achieve these targets ranges around US$160 billion (S$206 billion) per year.[10]

9 Reserve Bank of India, "Statement on Development and Regulatory Policies", Press Release, New Delhi: Reserve Bank of India, 9 October 2024, https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx-?prid=58852.

10 Fatih Birol and Amitabh Kant, "India's Clean Energy Transition Is Rapidly Underway, Benefiting the Entire World", International Energy Agency commentary, 10 January 2022, https://www.iea.org/commentaries/india-s-clean-energy-transition-is-rapidly-underway-benefiting-the-entire-world.

There are manifold challenges both at the national and international levels for the effective flow of sustainable finance. First and foremost is the inherent riskiness of the green or sustainable projects/proposals. At the forefront of climate risk mitigation is going to be the availability of green and sustainable substitutes, which require considerable technological development. Given the fact that green or sustainable projects are based on relatively newer technologies, which are yet to stabilise and are mainstreamed, the assessment of the financial and techno-economic viability of these projects becomes that much more challenging. This leads to an inherent increased credit risk as compared to traditional projects.

There are manifold challenges both at the national and international levels for the effective flow of sustainable finance.

Moreover, when it comes to sustainable finance, in a country such as India, apart from mitigation, the flow of resources for adaptation is equally important. Bankable projects invariably find credit; however, there are issues with partially bankable and non-bankable projects, which are generally associated with adaptation. Several issues in the form of data, knowledge and capacity gaps, technical and institutional constraints limit the proper identification and development of adaptation projects, which limit the access to both international as well as private finance. There is, thus, an urgent need to develop an ecosystem to mainstream adaptation finance and to rise above the typical Corporate Social Responsibility linked funding and public investments.

The Indian government has also been at the forefront in fostering sustainable and climate finance, be it the Green Hydrogen Mission, National Solar Mission, Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (Prime Minister's Farmer Energy Security and Upliftment Campaign), Pradhan Mantri Suryaghar Yojana (Prime Minister's Solar Home Scheme), Sovereign Green Bonds and the Long-Term low Emission Development Strategy, among others. There is a need to further augment these efforts by forging public-private partnerships and looking at blended finance options, including the role of development financial institutions (DFIs). Efforts are needed to address the commercial viability of projects and related market failures, along with transparency, integrity and disclosures. There is a need to collectively think about how sustainable projects involving new and evolving technologies can be derisked without subjecting the financial system to any spill-over risks. There is also a need for more intense focus on promoting research and development in the area of sustainable technologies.

A related area that comes up for discussion at various fora is the non-availability of bankable projects in the area of green and sustainable finance. In this context, firstly, there is a need to differentiate between the corporate projects and projects related to small and medium enterprises/micro, small and medium enterprises. A sustainable project could range from the installation of a renewable power project to something like the installation of a solar light on the rooftop of households/firms. India is witnessing a fast-paced technological transformation with more and more youngsters setting up start-ups by taking the entrepreneurial route to problem-solving. In this context, it is important to showcase such technological innovations which have stood the test of time and contributed towards sustainable development. We may need to consider the creation of a green and sustainable asset repository, which will showcase the use cases of such technologies for the financial institutions.

Capacity building needs to be looked at with special focus on increasing technical expertise.

Given the quantum of funding required for sustainable finance, besides other sectoral domestic investment requirements, there is a pressing need to leverage available international climate finance funds for climate mitigation and adaptation projects. There are two critical elements which can act as great enablers in this process – one is transparency, and the other is capacity building. Transparency, by means of disclosures, and adequate capacity building will enable both the donors and recipients to assess the risks involved and accordingly tailor the funding requirements. A graded approach needs to be followed for transparency and disclosures, which should be in consonance with the national circumstances. Capacity building needs to be looked at with special focus on increasing technical expertise. We need to build institutional capabilities to foster product innovation and provide technical evaluation support with respect to sustainable finance. These institutional capabilities can then be leveraged by financial institutions and the government machinery to augment credit flow to related sectors and act as a bridge with international funding organisations, DFIs and multilateral development banks for funding related to sustainable finance.

Conclusion

Climate change risks have started to impact the financial system and are envisaged to pose systemic risks in the future. The climate-specific vulnerabilities' interplay with real economy and financial

sector vulnerabilities can lead to financial stability risks. In this context, it is essential to build capabilities to ensure the correct assessment of these risks and put in place suitable adaptation and mitigation measures. Transparency and capacity building are going to be the key differentiators, and there is a need to collectively move in this direction. There lies a huge responsibility ahead, and there is hope that together, a definitive roadmap for sustainable growth and an environment for future generations can be provided.

Climate Change and Sustainable Development: Multiple Realities and Solutions for South Asia

Purnamita Dasgupta

Introduction: Mapping the Realities

Expectations of economic well-being have to reckon with high debt burdens and fiscal deficits.

Multiple realities exist across countries in South Asia. Globally, the region continues to lead on expectations of relatively faster economic growth than elsewhere in the world, while within the region, progress on human development indicators diverges widely by type of indicator and country. Economic development by counts of per capita incomes and reduction in absolute poverty defined at the US$1.25 (S$1.69) threshold has been impressive, even as income inequality has been increasing, as in many other countries. Expectations of economic well-being have to reckon with high debt burdens and fiscal deficits. Social well-being is impacted by both economic and environmental dimensions, with improvements in the quality of life traceable to economic indicators of well-being, co-existing with deep disruptions caused by economic and environmental shocks. In fact, the understanding of quality of life in the South Asian context is a mix of social, economic and cultural dimensions, justifying the call for measures of well-being that are beyond gross domestic product (GDP).[1]

It is hardly surprising that although tax revenue increases less than proportionately with GDP, public spending increases more than proportionately in South Asia, with positive and significant multiplier effects from government spending. Estimates suggest that an additional US$1 (S$1.29) of spending leads to an immediate increase in GDP of US$0.3 (S$0.38) and a cumulative increase of US$0.6 (S$0.77).[2] The fact that this is mostly due to capital expenditure and that fiscal policy in the region would amplify boom-and-bust cycles holds a mirror to the opportunities and the challenges in the region. The size of the cake and the quality of the cake are inseparable.

1 "Measuring well-being "beyond GDP" in Asia, South-East Asia and Korea", OECD Papers on Well-being and Inequalities, No. 22, Paris: OECD Publishing, 2024, https://www.oecd.org/en/publications/measuring-well-being-beyond-gdp-in-asia-south-east-asia-and-korea_1487aa23-en.html.

2 Robert Carl Michael Beyer and Lazar Milivojevic, "Fiscal Policy and Economic Activity in South Asia (English)", Policy Research Working Paper, Washington DC: World Bank Group, 2019, http://documents.worldbank.org/curated/en/711041553536608365.

Historically, there is no doubt that substantial evidence establishes that economic growth is positively correlated with poverty alleviation, the demographic transition and major improvements in the health status of human populations. Although this relationship may plateau at some stage, currently, the economies in South Asia are yet to get there and are facing these multiple realities. Yet, unregulated economic growth, industrialisation and urbanisation, along with demographic challenges, are increasingly held responsible for environmental risks that impact human well-being. Equity and efficiency are both victims of such environmental risks and call for urgent action to meet the challenge.[3] For South Asia, these include urban heat islands, climatic conditions for the spread of infectious diseases and pollution. Consequently, the solutions space has multiple domains to address in South Asia.

Equity and efficiency are both victims of such environmental risks and call for urgent action to meet the challenge.

Understanding Sustainable Development in South Asia

The pursuit of the multiple goals of sustainable development, each of which seems perfectly logical and wise to pursue, becomes a matter of making hard choices and prioritisation. The to-do list is a long and urgent one, even as the inflow of resources from sources external to the region faces uncertainties and even decline and geopolitical risks increase. For instance, South Asia was among the regions that saw decreases in Official Development Assistance (ODA), receiving around five per cent less of overall ODA flows in 2023 than in 2014.[4]

The Sustainable Development Report[5] tracks progress and trends on achieving the Sustainable Development Goals (SDGs) for all United Nations (UN) member states. The report assigns SDG index scores to each country, based on which countries are ranked. The score can be interpreted as a percentage of SDG achievement. For instance, a score of 100 indicates that all SDGs have been achieved.

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3 Purnamita Dasgupta, Vikram Dayal, Rajib Dasgupta, Kristie L. Ebi, Clare Heaviside, William Joe, Rupa Kumar Kolli, Meeta Keswani Mehra, Arabinda Mishra and Pankaja Raghav, "Responding to heat-related health risks: the urgency of an equipoise between emergency and equity", *The Lancet Planetary Health*, No. 11, 2024, https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(24)00246-8/fulltext.

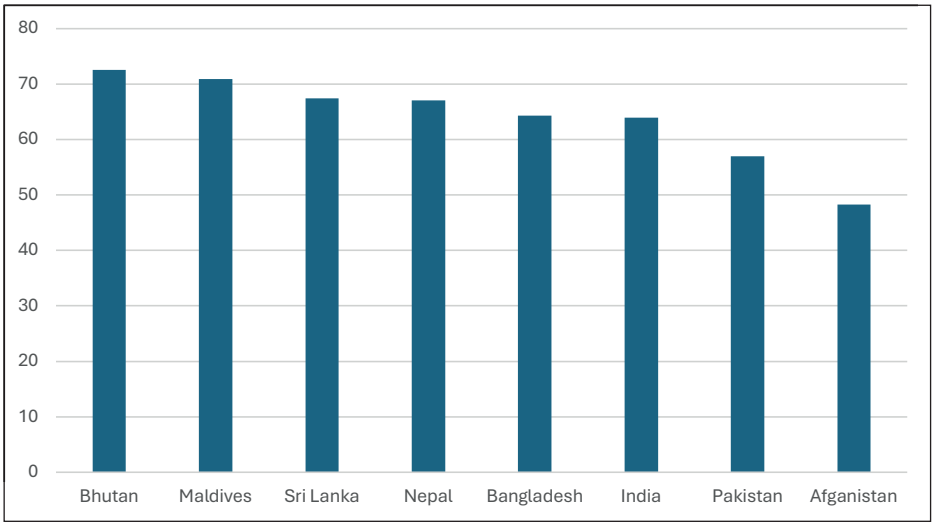
4 "Institute for Economics & Peace (IEP), "Official Development Assistance: Geopolitical Tensions, Economic Constraints & Shifting Priorities", New York: Institute for Economics & Peace, 2025, https://www.visionofhumanity.org/wp-content/uploads/2025/03/Official-Development-Assistance.pdf; https://unctad.org/publication/aid-crossroads-trends-official-development-assistance.

5 United Nations (UN), Sustainable Development Report 2024, (New York: SDG Transformation Centre, United Nations, 2024), https://datahub.sdgtransformationcenter.org/rankings/sustainable-development-report.

On the contrary, Afghanistan (48.24) has the lowest score among these eight countries, highlighting that not even half of the SDG targets have been achieved.

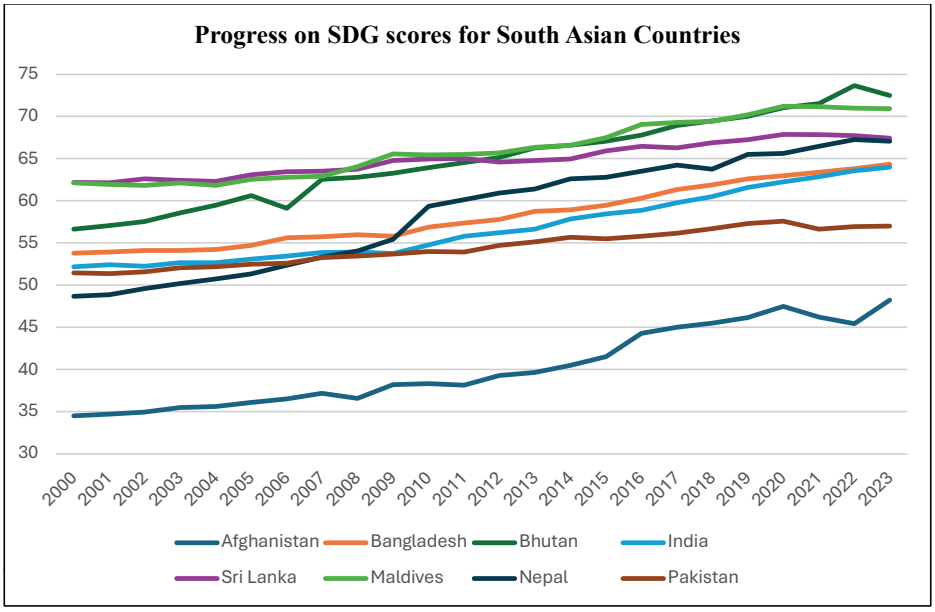
Figure 1 shows the SDG index scores (2023) of eight South Asian countries: Bhutan, Maldives, Sri Lanka, Nepal, Bangladesh, India, Pakistan and Afghanistan. A notable variation exists in their overall SDG performance. Bhutan (72.52) and the Maldives (70.93) lead the region, having achieved more than 70 per cent of their SDG targets. Sri Lanka (67.43), Nepal (67.07), Bangladesh (64.35) and India (63.99) demonstrate moderate progress, having achieved 60-70 per cent of their SDG targets. On the contrary, Afghanistan (48.24) has the lowest score among these eight countries, highlighting that not even half of the SDG targets have been achieved. Although over the years the performance has improved for all the countries, the pace has been uneven (Figure 2). In terms of the individual goals, it may be noted that the progress of the South Asian countries in terms of achievement of Sustainable Development Goal 1 on poverty alleviation shows variation. As per the UN report, the trend for SDG1 in Bhutan, Nepal, Bangladesh and Pakistan is categorised as 'moderately improving', Sri Lanka as 'stagnating', while India and Maldives are 'on track' for reaching the goal.

Figure 1: SDG Index Scores (Global) for the South Asian Countries



Source: Sustainable Development Report, UN 2024

Figure 2: SDG Index Scores of South Asian Countries Across Years (2000-2023)

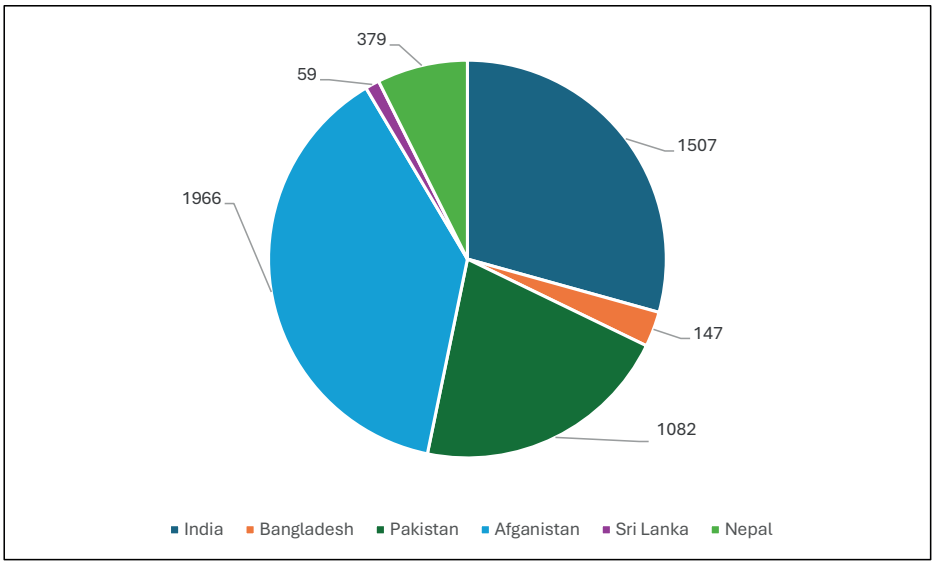


Source: SDG Index Dashboard (https://dashboards.sdgindex.org/explorer)

Why Climate Action Matters

At the same time, climate-related disasters are increasing in the region. Figure 3 shows the total deaths due to natural disasters in six South Asian countries: India, Bangladesh, Pakistan, Afghanistan, Sri Lanka and Nepal, in 2024. The highest number of deaths were in Afghanistan, followed by India and Pakistan.

Figure 3: Total Deaths due to Natural Disasters in 2024 in Six South Asian Countries



Source: EM-DAT, The International Disaster Database, The Centre for Research on the Epidemiology of Disasters (CRED), https://www.emdat.be/

As the future risks of slow-onset and extreme events from climate change increase, so do the risks of cascading and compounding consequences, in interactions with non-climatic risks.[6] For instance, a cyclone or extreme temperature event that causes crop losses either through reduced yield or loss of produce, impacts the physical and mental well-being of individuals from the economic losses, reduced labour productivity and coping stress. This may induce displacement and migration in search of supplementary or alternative livelihoods; reduce household incomes and increase local food prices; and when occurring over relatively large areas

6 Intergovernmental Panel on Climate Change (IPCC), "Summary for Policymakers", Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, H. Lee and J. Romero, Geneva: IPCC, 2023, 1-34, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf; and B. O'Neill, M. van Aalst, Z. Zaiton, et al., "Key Risks Across Sectors and Regions", *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, editors: H. O. Pörtner, D.C. Roberts, M. Tignor, et al., Cambridge: Cambridge University Press, 2022, 2411-2538, https://www.cambridge.org/core/books/climate-change-2022-impacts-adaptation-and-vulnerability/key-risks-across-sectors-and-regions/0E18FB2DE3A051281267D5C9C047986F.

or production scales, this can escalate further into price and quantity effects that impact sub-national, national and international prices.[7]

In extreme cases, there could be an inflationary effect. Losses can affect credit position and impact the banking sector on one hand, while damages and destruction to hard infrastructure and assets from extreme weather events, on the other hand, they can combine to cause business losses with consequent deterioration in the financial health of the economy.

Water, agriculture, health and disaster management are among the key sectors that are impacted by climate change and, in turn, have a major influence on human well-being in the region.[8] The continued dependence on monsoon-fed agriculture, fast urbanisation, increasing population and large coastal settlements make South Asia particularly vulnerable. The impact is exacerbated due to the interconnected nature of the climate crisis with access to fresh water, agriculture for livelihoods and food security, health care provisioning for vulnerable communities, to name a few. Melting glaciers in the Himalayas pose risks across several countries; sea level rise, cyclones and salinity intrusion threaten settlements and cities along the coasts of India and Bangladesh, while extreme heat waves are increasing in frequency and intensity in India and Pakistan.[9] One estimate suggests that in the South Asian economies, GDP could reduce by 1.8 per cent by 2050, due to climate impacts, with Nepal, Bangladesh and India being amongst the most affected.[10]

The continued dependence on monsoon-fed agriculture, fast urbanisation, increasing population and large coastal settlements make South Asia particularly vulnerable.

7 Ridhima Gupta and E. Somanathan, "The impact of temperature on worker absenteeism in the Indian manufacturing sector", 2022; Ruth Vargas Hill and Catherine Porter, "Vulnerability to drought and food price shocks: evidence from Ethiopia", *World Development* 96, 2017, https://www.sciencedirect.com/science/article/pii/S0305750X15306392; Stefan Siebert, Frank Ewert, Ehsan Eyshi Rezaei, Henning Kage and Rikard Graß, "Impact of heat stress on crop yield—on the importance of considering canopy temperature", *Environmental Research Letters* 9, 2014, https://iopscience.iop.org/article/10.1088/1748-9326/9/4/044012/meta.

8 Kathryn McMahon and Clark Gray, "Climate Change, Social Vulnerability and Child Nutrition in South Asia", *Global Environmental Change* 71, November 2021, https://pubmed.ncbi.nlm.nih.gov/34898861/; and Abdulaziz I. Almulhim, Gabriela Nagle Alverio, Ayyoob Sharifi, Rajib Shaw, Saleemul Huq, Md Juel Mahmud, Shakil Ahmad and Ismaila Rimi Abubakar, "Climate‡induced Migration in the Global South: an in-depth Analysis", *npj Climate Action* 3, 14 June 2024, https://www.nature.com/articles/s44168-024-00133-1.

9 The World Bank, *Groundswell Report*, Washington DC: The World Bank, 13 September 2021, https://www.worldbank.org/en/news/press-release/2021/09/13/climate-change-could-force-216-million-people-to-migrate-within-their-own-countries-by-2050.

10 Mahfuz Ahmed and Suphachol Suphachalasai, "Assessing the costs of climate change and adaptation in South Asia", *Asian Development Bank*, 2017, https://www.researchgate.net/publication/275335576_Assessing_the_Costs_of_Climate_Change_and_Adaptation_in_South_Asia.

There is growing evidence that the space to increase profits and incomes may shrink if we do not focus on sustainability. Disruptions to well-being not only do not happen with sufficient warning, but importantly, disruptions have downstream impacts that hit multiple markets, sectors, policies and programs. Shocks to the system emanate somewhere and end up with impacts elsewhere. Scientists have been warning about feedback loops which could amplify an initial change in warming, due to impacts such as snow cover melt, desertification, loss of forests, permafrost thawing and wildfires.[11] As the risks from the interplay between natural, economic and social systems escalate, the urgency of collective action to ensure that developmental gains are not eroded by environmental risks rises as well.

A key concern facing South Asia today is that of environmental pollution, and in particular, air pollution.

The starkest examples relate to human health. A key concern facing South Asia today is that of environmental pollution, and in particular, air pollution.[12] Estimates show that in 2022, South Asia had nine of the 10 cities most impacted by air pollution in the world, causing up to two million deaths annually.[13] While mortality attributable to household air and water pollution has been declining across the low and middle-income countries (LMICs), mortality attributable to ambient air pollution and lead pollution is increasing, including in countries in South Asia.[14] As per one estimate, environmental risks are a major cause of global deaths, and nearly a quarter of global disease burden could be prevented by reducing these risks.[15] While there have been major gains in well-being from increased access to clean water, a reduction in biomass consumption and improved waste management, more is needed to

11 William J. Ripple, Christopher Wolf, Timothy M. Lenton, et al., "Many risky feedback loops amplify the need for climate action", *One Earth*, Volume 6, Issue 2, 2023, 86-91, https://www.cell.com/one-earth/fulltext/S2590-3322(23)230004-0?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2590332223000040%3Fshowall%3Dtrue.

12 World Health Organization (WHO), "Clean air and energy access for healthier populations and universal health coverage", Geneva: World Health Organization, 30 June 2023, https://www.who.int/publications/m/item/clean-air-and-energy-access-for-healthier-populations-and-universal-health-coverage.

13 World Bank, *Striving for Clean Air: Air Pollution and Public Health in South Asia. South Asia Development Matters*, Washington, DC: World Bank, 2023, https://issuu.com/world.bank.publications/docs/9781464818318.

14 Richard Fuller, Philip J. Landrigan, Kalpana Balakrishnan, Glynda Bathan, Stephan Bose-O'Reilly, Michael Brauer, Jack Caravanos et al., "Pollution and health: a progress update", *The Lancet Planetary Health* 6, 17 May 2022, https://linkinghub.elsevier.com/retrieve/pii/S2542519622000900

15 Annette Prüss-Ustün, Jennyfer Wolf, Carlos Corvalán, Tina Neville, Robert Bos, Maria Neira, "Diseases due to unhealthy environments: an updated estimate of the global burden of disease attributable to environmental determinants of health", *J Public Health (Oxf)*, 2017, https://pubmed.ncbi.nlm.nih.gov/27621336/.

reduce chemical pollution and ambient air pollution. The high social and economic costs of pollution are well established. In India, pollution in the capital city of New Delhi presents an example of the conundrum posed when sustainability is not a core component of the development agenda.

The high social and economic costs of pollution are well established.

Per capita income in New Delhi is amongst the highest across Indian states, and the top policymakers and functionaries of the executive and judiciary reside in this city, including politicians, lawmakers and bureaucrats. There are widespread coverage and awareness about the issue, attribution of adverse health impacts, especially respiratory illnesses, to particulate matter exposure have been done, and there is convergence across source apportionment studies on the reasons for the winter smog that prevails across the city. Yet, in spite of all these strengths, there is inertia in the system, and the prevention of air pollution remains a persisting challenge. During the lockdown in the COVID-19 pandemic, there was a stark contrast in the movement of large numbers of migrant labourers moving to their home states, while the air and water pollution levels receded.[16] Surely, there must be a better way to manage environmental risks. The need for collective action is urgent, and the immediacy is here!

Resource Constraints and Barriers

South Asia faces major risks from climate change, and the observed impacts attributable to climatic variability are increasing while adaptation efforts fall short, with huge gaps in international adaptation finance flows. The title of the 2024 Adaptation Gap report describes the situation well for the South Asian context: *The Adaptation Gap Report 2024: Come hell and high water*.[17] Recent estimates suggest that more than 800 million people live in future climate change hotspots in South Asia, and by 2050, climate migrants could total over 40 million in the region.[18]

16 Purnamita Dasgupta and K. Srikanth, "Unbundling air pollution concerns: A closer look at socio-economic factors", In P. Dasgupta, A. R. Saha and R. Singhal (Eds.), *Sustainable development insights from India*, India Studies in Business and Economics, (Springer, 2021), https://doi.org/10.1007/978-981-33-4830-1_21.

17 United Nations Environment Programme (UNEP), *Adaptation Gap Report 2024: Come Hell and High Water*, New York: UNEP, 7 November 2024, https://www.unep.org/resources/adaptation-gap-report-2024

18 "South Asia Climate Roadmap", World Bank, 28 October 2021, https://www.worldbank.com/en/region/sar/publication/south-asia-climate-roadmap.

Current funding is much below requirements, and current trends in financing to the region suggest that the writing is on the wall:

The New Collective Quantified Goal established at Conference of the Parties (COP) 29, was below expectations of the LMICs, even as the next round of nationally determined contributions (NDCs) is expected to ramp up ambition. The goal established was to triple finance to the developing countries from the mostly unmet goal of US$100 billion (S$135 billion) annually in previous years to US$300 billion (S$405 billion) annually by 2035.[19] As per one estimate, costing estimates provided in the national climate plans of Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka indicate that the mitigation actions in NDCs and targets in the National Adaptation Plans, cost approximately US$600 billion (S$810 billion) – a total of US$1,758 billion (S$2,373.3 billion) till 2030.[20] Current funding is much below requirements, and current trends in financing to the region suggest that the writing is on the wall: as climate impacts increase and adaptation costs rise, countries in the region will need to plan for adaptation costs with their own resources to a significant extent.

Persistent and emerging barriers to action on the global front include unfulfilled commitments on resource and technology flows to the region, unsettled concerns on the distribution of the remaining carbon budget based on historical emissions and carbon taxes (for example, the announced carbon border adjustment mechanisms on imported goods by the European Union). Unfortunately, South Asia has several hotspots for climate impacts and risks, and the erosion of the gains of development for citizens across South Asia is a reality that current science establishes convincingly. As the President-designate of COP30 stated recently, "change is inevitable – either by choice or catastrophe."[21] The choice route would be to take action that builds resilience through timely climate action.

19 "COP29 UN Climate Conference Agrees to Triple Finance to Developing Countries, Protecting Lives and Livelihoods", United Nations Framework Convention on Climate Change (UNFCCC), 24 November 2024, https://unfccc.int/news/cop29-un-climate-conference-agrees-to-triple-finance-to-developing-countries%E2%80%91protecting%E2%80%91lives%E2%80%91and%E2%80%91livelihoods.

20 Manjeet Dhakal and Tenzin Wangmo, "Why 2024 Needs to Deliver on Climate Finance for South Asia and the World", *Climate Analytics*, 27 February 2024, https://climateanalytics.org/comment/why-2024-needs-to-deliver-on-climate-finance-for-south-asia-and-the-world.

21 United Nations Framework Convention on Climate Change (UNFCCC), "Letter from COP 30 President Designate", 25 April 2025, https://unfccc.int/documents/645947.

Characterising the Solution Space

Climate action has co-benefits, and the prevention of pollution is a good example of the potential for improving lives. It can contribute to improving pollution if it reduces short-lived climate pollutants, encourages energy efficiency, scales up renewable energy, adopts electric transportation and adopts clean cooking fuels. Similarly, improving urban green infrastructure, solid and liquid waste management, conserving land and water-based ecosystem services, and reducing run-offs of chemicals and soil pollutants also contribute to reducing land and water pollution. While much of the management measures and available technologies are well known, the fact that the social costs of inaction are usually much higher than the costs of prevention is also well known.[22] Markets either fail or are slow to provide the necessary signals to internalise the costs, adopt the required measures and harness the gains. An acceleration for change is urgently called for through a judicious mix of proactive regulation, social behaviour and legal instruments.

While much of the management measures and available technologies are well known, the fact that the social costs of inaction are usually much higher than the costs of prevention is also well known.

The solution space is, therefore, characterised by multiple solutions where change starts by recognising that what we value is perhaps changing. We value the future, both near term and long term, not just for meeting aspirations, but also for safeguarding the present. South Asia is perhaps well placed to appreciate the approach. An example is the efforts currently ongoing to minimise land and water pollution that have been initiated as actions to enhance relational (nature for culture) values in parts of the Hindu Kush Himalaya.[23]

Examples of success in advancing sustainable development with integrated action are aplenty in the region. For instance, the ongoing push for renewable energy for vulnerable groups through off-grid

22 The World Bank, *The Cost of Air Pollution: Strengthening the Economic Case for Action*, (2016), https://openknowledge.worldbank.org/handle/10986/25013.

23 Purnamita Dasgupta and Bandana Shakya, "Ecosystem services as systemic enablers for transformation in the Hindu Kush Himalaya: an analytical synthesis", *Regional Environmental Change*, Springer, February 2023, https://link.springer.com/article/10.1007/s10113-022-02022-x.

solar power,[24] health goals through effective disaster management[25] and community-based natural farming in India's Andhra Pradesh;[26] community-based early warning systems and agricultural adaptation[27] and locally led adaptation[28] in Bangladesh; community forestry[29] and watershed management[30] in Nepal. These are a few examples where empowerment, climate adaptation or mitigation, and an increase in incomes of the poor and those in remote locations have been actively pursued among countries in the region.

In spite of the many success stories, upscaling and sustaining efforts in the face of increasing uncertainty have been major challenges.

In spite of the many success stories, upscaling and sustaining efforts in the face of increasing uncertainty have been major challenges. With uncertainties increasing in the Global North, financing climate action is as much about deploying domestic resources as it is about developed countries providing resources to the region. The Loss and Damage compensation rules are yet to be worked out, while financing soft costs such as institution building and overcoming capacity constraints is not forthcoming anywhere near the requirements. The South Asian economies are moving towards setting up domestic strategies and funds for resource mobilisation, from the Bangladesh Climate and Development Platform

24 Binit Das, "PMJANMAN for Tribal Electrification: Beacon of Hope or Mirage?", *Down To Earth*, 16 January 2024, https://www.downtoearth.org.in/energy/pm%20janman%20for%20tribal%20electrification%20beacon%20of%20hope%20or%20mirage%2093913; and Charles Rajesh Kumar and M A Majid, "Renewable energy for sustainable development", *Energy Sustainability and Society*, 10, 2020, https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0232-1.

25 Purnamita Dasgupta and Girika Sharma, *Climate Finance for Adaptation and Sustainable Development in India*, *India's Public Finance and Policy Challenges in the 2020s*, India Studies in Business and Economics, (Singapore: Springer), https://papers.ssrn.com/sol3/Delivery.cfm/5287331.pdf?abstractid=5287331&mirid=1.

26 Andhra Pradesh Community Managed Natural Farming (APCNF), Government of Andhra Pradesh (India), https://apcnf.in/.

27 "Bridging National Strategy and Local Action: Bangladesh's Success in Vertical DRR Integration", case study, United Nations Office for Disaster Risk Reduction (UNDRR), New York: United Nations, 27 May 2025, https://www.undrr.org/resource/case-study/bridging-national-strategy-and-local-action-bangladeshs-success-vertical-drr.

28 Afsara Binte Mirza, Savio Rousseau Rozario and Chowdhury Abrar Zahin, "Scaling Up Locally Led Adaptation in Bangladesh: Three Action Areas", IIED Briefing, (London: International Institute for Environment and Development, 23 May 2023, https://www.iied.org/21456iied.

29 Krishna Shrestha and Robert Fisher, "Labour Migration, the Remittance Economy and the Changing Context of Community Forestry in Nepal", in *Transnational Labour Migration and Livelihoods in Rural Asia: Tracing Patterns of Agrarian and Forest Change*, (2017).

30 Prakash Singh Thapa, Sunita Chaudhary and Purnamita Dasgupta, "Contribution of integrated watershed management (IWM) to disaster risk reduction and community development: Lessons from Nepal", *International Journal of Disaster Risk Reduction*, 2022, https://www.sciencedirect.com/science/article/abs/pii/S2212420922002485?via%3Dihub.

to India's development of a taxonomy for climate finance to encourage capital flows for climate mitigation action.[31]

The World Bank has committed to directing 35 per cent of its lending portfolio in South Asia to climate-related actions, on average, over the next five years.[32] Total economic losses could be at an average of US$160 billion (S$216 billion) by 2030, as per these World Bank estimates. Gaps in adaptation financing for the region are increasing. Globally, current estimates place the adaptation finance gap at about US$187-359 billion (S$252.45-484.65 billion) per year.[33] On the positive side, countries are developing their national adaptation plans, with strategies for medium and long-term measures to increase resilience and adaptation. Bangladesh, Sri Lanka and Nepal have already designed their plans, while others are being finalised.[34]

Several market-oriented schemes in the region have not yet taken off.

The solutions space is characterised by two major challenges. Firstly, the challenges with mobilising domestic resources to overcome the gaps in international fund flows. Several market-oriented schemes in the region have not yet taken off. Carbon markets and green bonds are in nascent stages for the most part. Carbon taxes have been mooted and seem to be an efficient way of raising domestic public finance. However, these require careful supportive measures to ensure that outcomes are not inequitable or do not place a burden on the poor. Additionally, the social assurance that the revenues will be earmarked for advancing equity and net-zero targets is difficult to achieve. Secondly, this space is also about developing metrics, markers and measures of progress that will work well in guiding future investments. Key features specific to South Asia would be to further the measurement of the interlinkages between climate change and sustainable development for poverty elimination, energy security and the avoidance of forced displacement.

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31 International Monetary Fund (IMF), "Bangladesh and Its Partners Are Launching the Bangladesh Climate and Development Platform to Leverage Adaptation and Mitigation Investments", 3 December 2023, https://www.imf.org/en/News/Articles/2023/12/03/bangladesh-launch-climate-development-platform-to-leverage-adaptation-and-mitigation-investments; Government of India, "Speech of Nirmala Sitharaman, Finance Minister of India: Budget 2025-2026", New Delhi: Government of India, 2025, https://www.indiabudget.gov.in/doc/budget_speech.pdf.

32 "South Asia Climate Roadmap", World Bank (WB), Washington DC: World Bank, 28 October 2021, https://www.worldbank.org/en/region/sar/publication/south-asia-climate-roadmap.

33 United Nations Environment Programme (UNEP), *Adaptation Gap Report 2024: Come Hell and High Water*, New York: UNEP, 7 November 2024, https://www.unep.org/resources/adaptation-gap-report-2024.

34 "Submitted NAPs from Developing Country Parties", NAP Central, https://napcentral.org/submitted-NAPs

Conclusion: Advancing Integrated Action

The concerns often get subsumed in a 'sufficientarianism' principle, which defines and presupposes thresholds for quality-of-life standards and fails to incorporate specific developing country concerns.

In recent years, largely spurred by concerns for conservation in the Global North, the understanding of the linkages between biodiversity and climate change for the well-being of human populations has received substantial research focus and some funding, further enabled by international processes such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. However, apart from specific instances of research and policy for targeted groups of indigenous and local communities, the integration of developmental concerns of the LMICs lags. The concerns often get subsumed in a 'sufficientarianism' principle, which defines and presupposes thresholds for quality-of-life standards and fails to incorporate specific developing country concerns. For South Asia, for instance, there are a host of trade-offs and challenges that are neither measured nor incorporated well in these assumptions of being able to attain a minimal quality of life since public sector support is also not guaranteed with fiscal and global uncertainties at play. These include job losses, displacement, environmental degradation, declines in social security and social trust.[35]

Gains in the solution space do not necessarily accrue to just one sector or one community. A recent report[36] highlights the interconnectedness between health, climate change, water, food, energy and biodiversity, while documenting examples of nexus response options or solutions which have impacts across these elements. Evidence from the region is strong on the positive synergies between food, water and health based on community-led adaptation practices, and between health, traditional knowledge on medicines, food baskets and biodiversity.

35 Stephan Klasen, Giovanni Andrea Cornia, Rebeca Grynspan, Luis F. López-Calva, Nora Lustig, Augustin Fosu, Sripad Motiram et al., "Economic inequality and social progress", In: *Rethinking Society for the 21st Century: Report of the International Panel on Social Progress: Volume 1: Socio-Economic Transformations*, (Cambridge: Cambridge University Press, 2018), 83-139, https://www.cambridge.org/core/books/abs/rethinking-society-for-the-21st-century/economic-inequality-and-social-progress/9C806600438DFE0E0CD9C96D6514C4F6; and Purnamita Dasgupta, Ottmar Edenhofer, A. M. Avendano Amezquita, A. Bento, Simon Caney, David De la Croix, A.Fosu et al., "Economic growth, human development and welfare", In: *Rethinking Society for the 21st Century: Report of the International Panel on Social Progress. Volume 1: Socio-Economic Transformations*, (Cambridge: Cambridge University Press, 2018), 141-186, https://www.cambridge.org/core/books/abs/rethinking-society-for-the-21st-century/economic-growth-human-development-and-welfare/8B7659D1E1754DCC928C080A5C487650.

36 Pamela McElwee, P. A. Harrison, T. L. van Huysen, V. Alonso Roldán, E. Barrios, P. Dasgupta, F. DeClerck et al., *Summary for Policymakers of the Thematic Assessment Report on the Interlinkages among Biodiversity, Water, Food and Health of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, (2024).

Substantial knowledge gaps exist, however, and documentation requires strengthening on regional synergies and particularly trade-offs.

Arguably, the cause of social progress is best served by advancing the trinity of equity, climate resilience and development across South Asia.[37] Such evidence, however, is hard to come by. Energy security as a co-benefit from mitigation action advancing renewables is an example of a win-win. However, even this requires careful design. It is known that energy prices and access issues can lead to inequities; the positive effects of shifting to renewables can be undermined and prevailing process deficiencies can carry over, leading to injustice in the outcomes from climate action.[38]

Financing and technological requirements are key to success.

Evidence establishes that unilaterally advancing on climate action is likely to benefit some stakeholders more than others. Recognising that some actions advance trade-offs with development, while some promote synergies with development, is critical to the understanding of both adaptation and mitigation for developing countries.[39] Resource planning would tend to follow this logic. The classic example lies in the case of the hard-to-abate sectors – cement, iron and steel, non-ferrous metals and chemicals – all essential for meeting developmental needs. Financing and technological requirements are key to success. Reducing the costs of climate action requires bundling it with sustainable development.

Finance has been a key focus throughout the history of the global climate negotiations. The international consensus-building processes take time, and the finance received so far has repeatedly fallen short of the promises made to developing countries. Multiple references were made to grants and concessional finance in the draft versions of the text proposed

37 Purnamita Dasgupta, G Sharma, A Prakash, "Equity, Climate Resilience, Sustainable Development: Bundling for Social Well-being", In: Anjal Prakash and Marcella d'Souza eds. *Changing Tides: Climate Action and Justice in India*, (London: Routledge, forthcoming October 2025), https://www.routledge.com/Changing-Tides-Climate-Action-and-Justice-in-India/Prakash-DSouza/p/book/9781041114970?srsltid=AfmBOopIXSIYSfcAILTr9deRUgGL8Yz7cdjetyf8ZJ1ICX3gpLjbNoSH.

38 S Markkanen & A Anger-Kraavi, "Social impacts of climate change mitigation policies and their implications for inequality", *Climate Policy*, 2019, https://www.tandfonline.com/doi/full/10.1080/14693062.2019.1596873; J Millward-Hopkins, "Inequality can double the energy required to secure universal decent living", *Nature Communications*, 2022, https://www.nature.com/articles/s41467-022-32729-8.

39 Joyashree Roy, Anjal Prakash, Shreya Some, Chandni Singh, Rachel Bezner Kerr, Martina Angela Caretta, Cecilia Conde et al., "Synergies and trade-offs between climate change adaptation options and gender equality: a review of the global literature", *Humanities and Social Sciences Communications*, No. 9, 2022, https://www.nature.com/articles/s41599-022-01266-6.

The lived reality is that most finance flows have been in the form of private finance and primarily for mitigation action.

during the climate negotiations at COP29. The lived reality is that most finance flows have been in the form of private finance and primarily for mitigation action. International flows of public and concessional finance have been low, with most proposals falling short of expectations as discussed in Article 9.[40] In the run-up to COP29, expectations ran high on the total quantum of finance under the New Collective Quantified Goal, but the final amount disappointed most LMICs.[41] Achieving a collective goal of climate action at a scale hitherto unforeseen may well be a strategic, urgent and real-time deliverable that developed countries need to be held accountable for, but too much remains uncertain. The pact acknowledges the need to reform the multilateral financial architecture and to remove barriers faced by developing countries in financing climate action, such as the high costs of capital, limited fiscal space, unsustainable debt levels, high transaction costs and conditionalities for accessing climate finance.[42] The imperative is to set out a package which addresses not just the quantum of finance, but meaningfully bundles mechanisms of disbursement, transparency frameworks, maps milestones, respects equity principles and benchmarks allocations for mitigation, adaptation and loss and damage.

A major resource constraint for South Asian economies is that adaptation finances have been abysmal at the international scale. The recent experience at COP29 has left developing countries disappointed with both mitigation and adaptation finance. South Asia's riverine and coastal vulnerabilities are extremely high – for human settlements, assets and infrastructure, forests and biodiversity. The fact of the matter is that most countries meet adaptation expenditures from public finance from domestic sources. Recent trends seem to indicate that this is likely to continue, for both adaptation and mitigation. Even on the mitigation front, while recent climate talks have advanced on some procedural fronts, financial flows and procedures continue to be raised as grave

40 United Nations Framework Convention on Climate Change (UNFCCC), "Paris Agreement - Article 9", New York: United Nations, 12 December 2015, https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

41 Vinod Rai, "COP29 Deal on Climate Finance: Disappointment for the Developing Nations", *ISAS Brief*, National University of Singapore (NUS), November 2024, https://www.isas.nus.edu.sg/papers/cop29-deal-on-climate-finance-disappointment-for-the-developing-nations/

42 "Resolution on New Collective Quantified Goal on Climate Finance", Decision -/CMA.6, United Nations Framework Convention on Climate Change (UNFCCC), https://unfccc.int/sites/default/files/resource/CMA_11%28a%29_NCQG.pdf

concerns. Most developing countries, including the BRICS bloc,[43] continue to grapple with persistent issues on inadequacies in climate finance flows, strengthening technology cooperation and advancing the global goal on adaptation, even as emergent concerns such as the impact of climate action on trade raise additional questions about processes and trust in various international fora.

Risks will magnify, and both mitigation and adaptation will be important. Domestic sources and strategic partnerships at the regional level and with businesses are going to be increasingly important for successful transitions to net zero. The reality of transition costs is that these will need to meet investment needs for capex, operational costs and institutional costs. Resources will need to be devoted to building state capacities to effectively leverage international as well as domestic finance mobilisation and deployment in a cost-effective manner. The research community too has to contribute, in terms of high-quality strategic work on localised impacts, generation of evidence on advancing the trinity of equity, sustainability and resilience, valuation and cost-effectiveness for guiding investments and developing financial mechanisms for hard-to-abate sectors.

The reality of transition costs is that these will need to meet investment needs for capex, operational costs and institutional costs.

43 The BRICS is a group formed by 11 countries: Brazil, Russia, India, China, South Africa, Saudi Arabia, Egypt, the United Arab Emirates, Ethiopia, Indonesia and Iran. It serves as a political and diplomatic coordination forum for countries from the Global South and for coordination in the most diverse areas. See https://brics.br/en/about-the-brics.

Rising Costs of Climate Change: Global Risks, Economic Impacts and South Asia's Vulnerabilities

Archana Chaudhary

Introduction

Climate change represents one of the most defining challenges of our time as it reshapes ecosystems, economies and societies worldwide.

The World Meteorological Organisation has declared 2024 the warmest year ever recorded, based on analysis from six international datasets.

The World Meteorological Organisation has declared 2024 the warmest year ever recorded, based on analysis from six international datasets.[1] This cements a decade-long streak of record-breaking temperatures, with each passing year ranking the hottest in history – a stark reminder of the accelerating climate crisis.[2]

The consequences are apparent in the rising frequency of heatwaves, cyclonic storms, soaring food prices due to crop damage and even increased flight turbulence.[3] From 1980 to 1999, 3,656 climate-related disasters, including extreme weather events, were recorded.[4] In contrast, of the 7,348 major disasters reported between 2000 and 2019, 6,681 were linked to climate change.

Weather-related disasters racked up an estimated US$2.97 trillion (S$4.01 trillion) in economic losses globally between 2000 and 2019, claiming

1 "2024 Confirmed as Warmest Year on Record", World Meteorological Organization (WMO), 10 January 2025, https://wmo.int/news/media-centre/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level.

2 National Aeronautics and Space Administration (NASA) Global Climate Change, "Vital Signs: Global Temperature", January 2025, https://climate.nasa.gov/vital-signs/global-temperature/?intent=121.

3 "Global Warming and Hurricanes: An Overview of Current Research", Geophysical Fluid Dynamics Laboratory (GFDL), National Oceanic and Atmospheric Administration (NOAA), 20 November 2024, https://www.gfdl.noaa.gov/global-warming-and-hurricanes/; Eshita Gupta, Bharat Ramaswami and E. Somanathan, "The Distributional Impact of Climate Change: Why Food Prices Matter", Ashoka University Economics Discussion Paper no. 50, 6 January 2021, https://dp.ashoka.edu.in/ash/wpaper/paper50_0.pdf; and Tiffany A. Shaw and Osamu Miyawaki, "Fast Upper-Level Jet Stream Winds Get Faster under Climate Change", *Nature Climate Change* 14, no. 1 (2024): 61-67, 30 November 2023, https://doi.org/10.1038/s41558-023-01884-1.

4 "The Human Cost of Disasters: An Overview of the Last 20 Years (2000–2019)", Centre for Research on the Epidemiology of Disasters (CRED) and United Nations Office for Disaster Risk Reduction (UNDRR), (Geneva: UNDRR, 2020), https://www.preventionweb.net/files/74124_humancostofdisasters20002019reportu.pdf.

1.23 million lives and affecting 4.2 billion people, according to the United Nations (UN).[5] The Intergovernmental Panel on Climate Change projects that without major emissions reduction, global temperatures could rise by up to 5.7 degrees Celsius by the end of the 21st century.[6]

This would cause severe, widespread impacts — intense heatwaves, rising sea levels and widespread disruptions to ecosystems and human livelihoods, making the planet inhospitable.[7] However, the risks could be halved if nations transition to lower-emission economies.[8] And by achieving the 2015 Paris Agreement goals to limit warming to 1.5 degrees Celsius and cut greenhouse gas emissions by 43 per cent by 2030.[9]

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South Asia, with nearly a quarter of the global population, faces high stakes due to dense populations, rapid urbanisation, agricultural reliance and limited adaptive capacity, making it highly vulnerable. Without adaptation investment, climate risks could threaten approximately 15 per cent of South Asia's gross domestic product (GDP) by 2050.[10]

Particularly Complicated

South Asia's geography and spread of population accentuates its climate vulnerabilities and risks. At 405 people per square kilometre of land area, South Asia is the world's most densely populated sub-region.[11]

5 World Meteorological Organization (WMO), "UN Report: Dramatic Rise in Climate Disasters Over Last Twenty Years", *WMO News and Media Centre*, 12 October 2020, https://wmo.int/media/news/un-report-dramatic-rise-climate-disaster-over-last-twenty-years.

6 Intergovernmental Panel on Climate Change (IPCC), "Climate Change 2021: The Physical Science Basis", Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Edited by V. Masson-Delmotte et al., Cambridge: Cambridge University Press, 9 August 2021, https://www.ipcc.ch/report/ar6/wg1/chapter/chapter-4/.

7 Intergovernmental Panel on Climate Change (IPCC), "Sixth Assessment Report (AR6)", 20 March 2023, https://www.ipcc.ch/assessment-report/ar6/.

8 Seth Borenstein, "World on Pace for Significantly More Warming Without Immediate Climate Action, Report Warns", *Associated Press*, 25 October 2024, https://apnews.com/article/climate-change-chaos-warming-15-pollution-carbon-832773cebb14b4ea8c8930580537e567.

9 United Nations Framework Convention on Climate Change, "The Paris Agreement", 12 December 2015, https://unfccc.int/process-and-meetings/the-paris-agreement.

10 "Weather Warning: Assessing Countries' Vulnerability to Economic Losses from Physical Climate Risks", S&P Global Ratings, 27 April 2022, https://www.spglobal.com/ratings/en/research/pdf-articles/220427-economic-research-weather-warning-assessing-countries-vulnerability-to-economic-losses-from-physical-clim-101529900.

11 "Population Density (People per sq. km of Land Area)", World Development Indicators, World Bank, Last updated 16 December 2024, https://databank.worldbank.org/source/world-development-indicators/Series/EN.POP.DNST.

India, with its vast complexity, has about 1.43 billion people. The Maldives, an archipelago of 1,200 islands, has 0.5 million; Bhutan and Nepal have 0.8 million and 30.9 million, respectively. Sri Lanka has 21.9 million, Bangladesh 169.4 million in the world's largest delta, Pakistan 245.2 million across varied landscapes and Afghanistan 42.2 million in rugged terrain.

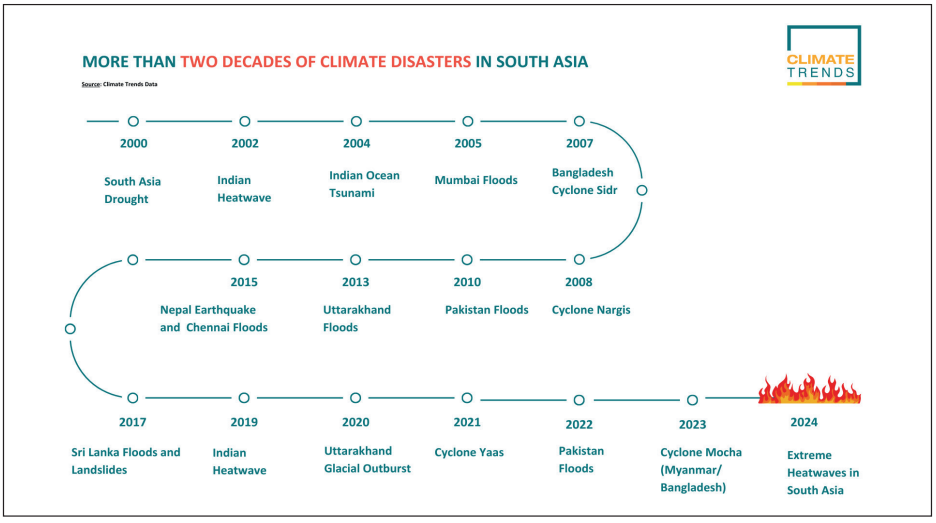
This density places 32 per cent of South Asia's population – the largest global cohort – at high risk from extreme weather, according to the World Bank.

This density places 32 per cent of South Asia's population – the largest global cohort – at high risk from extreme weather, according to the World Bank.[12] By contrast, North America's high-risk population share is below one per cent.

In the past 30 years, South Asia has starkly shown how human impacts on ecosystems compound climate risks, resulting in rising environmental, economic, social, cultural and geopolitical challenges. In short, it is in the grip of a polycrisis.

The timeline of some of the biggest disasters faced by South Asia since the start of this century is illustrative of the major risks the region faces.

Figure 1: More than Two Decades of Climate Disasters in South Asia



Source: Climate Trends Data

12 "Pathways Out of the Polycrisis: Main Messages", World Bank, September 2023, https://openknowledge.worldbank.org/server/api/core/bitstreams/ed189cbd-46e7-4c9f-ab78-a68d50df5e67/content.

South Asia's Climate Change Challenges

Geographic Vulnerabilities

At 5.2 million square kilometres, South Asia spans approximately one per cent of the world's land area.[13] Of this, around 39 per cent land is classified as arable.

South Asia, heavily reliant on agriculture to feed its dense population, faces significant land degradation. Approximately 43 per cent (140 million hectares) of the region's agricultural land is degraded, resulting in US$10 billion (S$13.5 billion) annual losses.[14]

South Asia, heavily reliant on agriculture to feed its dense population, faces significant land degradation.

In agriculturally dependent South Asia, land degradation affects about 43 per cent (140 million hectares) of farmland and remains a major concern. Climate-induced crop failures have cut agricultural productivity by 15 per cent, worsening food insecurity for over 400 million people.[15]

The coastal areas of Bangladesh, India and Sri Lanka face growing pressure with sea levels projected to rise 3-16 centimetres by 2030 and 7-50 centimetres by 2070, alongside more frequent flash floods and cyclones devastating shorelines.[16] In the Himalayas, rapid glacial retreat threatens freshwater access for millions in India, Nepal and Pakistan, affecting agriculture, industry and drinking water.[17]

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13 Asian Farmers' Association for Sustainable Rural Development, "Sustainable Family Farming Agriculture in South Asia through Partnerships", *AFA Issue Paper*, vol. 9, no. 1, 11 March 2019, http://asianfarmers.org/wp-content/uploads/2019/03/AFAIssuePaperVol9No1_Sustainable_Family_Farming_Agriculture_in_South_Asia_through_Partnerships.pdf.

14 Saskia Keesstra and Artemi Cerdà, "Land Degradation: Causes, Impacts and Interlinks with the Climate System", In *Encyclopaedia of the UN Sustainable Development Goals: Climate Action*, edited by Walter Leal Filho, Anabela Marisa Azul, Luciana Brandli, Pinar Gökcin Özuyar and Tony Wall, (Cham: Springer, 22 June 2021), https://link.springer.com/referenceworkentry/10.1007/978-3-319-71062-4_48-1.

15 Abdul Rehman, Zakia Batool, Hengyun Ma, Rafael Alvarado and Judit Oláh, "Climate Change and Food Security in South Asia: The Importance of Renewable Energy and Agricultural Credit", *Humanities and Social Sciences Communications*, 29 February 2024, https://www.nature.com/articles/s41599-024-02847-3.

16 A. K. S. Huda and M. T. M. Iqbal, "Impact of Climate Change and Variability on Food Security in the Asia-Pacific Region", *Asia-Pacific Sustainable Development Journal* 29, May 2022, https://www.unescap.org/sites/default/d8files/2022-06/APSDJ%20Vol.%2029,%20No.%201,%20May%202022-pp119-141_Rev.pdf; and "Chapter 4: Sea Level Rise and Implications for Low-Lying Islands, Coasts and Communities", *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*, Intergovernmental Panel on Climate Change (IPCC), 24 September 2019, https://www.ipcc.ch/srocc/chapter/chapter-4-sea-level-rise-and-implications-for-low-lying-islands-coasts-and-communities/.

17 Pankaj Kumar and Rattan Lal, "Climate Change and Its Impact on Agricultural Productivity in India", *Journal of Agronomy and Crop Science*, No. 207, 2021, https://doi.org/10.1016/j.envc.2021.100018; and Philippus Wester, Arabinda Mishra, Aditi Mukherji and Arun Bhakta Shrestha, eds. *The Hindu Kush Himalaya Assessment: Mountains, Climate Change, Sustainability and People*, (Springer International Publishing, 5 January 2019), https://lib.icimod.org/record/34383.

Urbanisation, Development Challenges and Migration

By 2030, the South Asian cities will add over 200 million new residents – comparable to Pakistan's population.[18] Bangladesh and Sri Lanka already face rising sea levels threatening millions with displacement; by 2050, 17 per cent of Bangladesh could be submerged, displacing over 18 million people.[19]

Urban centres like Mumbai, Karachi and Dhaka lack adequate flood management, with poor drainage worsening disaster impacts.

With much urban infrastructure for 2050 still unbuilt, policymakers must plan for a warmer, more urban future. Urban centres like Mumbai, Karachi and Dhaka lack adequate flood management, with poor drainage worsening disaster impacts.[20] By 2050, over 40 million South Asians may be internally displaced by climate factors such as cyclones, floods, droughts and heatwaves, threatening livelihoods and prompting migration.[21] The International Organisation for Migration estimates 25 million to one billion climate refugees worldwide by 2050, with many from South Asia.[22]

Socioeconomic Dependencies

South Asia's economy centres on rural communities and agriculture, with 65 per cent of the population – mainly the poorest – living rurally and relying on farming, a sector highly sensitive to rainfall and climate risks.[23] Farming contributes 18 per cent of GDP and employs 60 per cent of the population.[24] Despite this, the region has 40 per cent of the world's

18 Ella Kim and Monica Jain, "Sizzling Cities: Planning for Urban Heat Resilience in South Asia", *World Bank Blogs*, 3 May 2023, https://blogs.worldbank.org/en/endpovertyinsouthasia/sizzling-cities-planning-urban-heat-resilience-south-asia.

19 Prothom Alo English Desk, "Rising Sea-Level to Submerge Around 17pc of Bangladesh by 2050", *Prothom Alo*, 14 September 2021, https://en.prothomalo.com/environment/rising-sea-level-to-submerge-around-17pc-of-bangladesh-by-2050.

20 "Building a Climate Resilient Future for Coastal South Asia", PreventionWeb, 22 December 2022, https://www.preventionweb.net/news/building-climate-resilient-future-coastal-south-asia.

21 Kanta Kumari Rigaud, Alex de Sherbinin, Bryan Jones, Jonas Bergmann, Viviane Clement, Kayly Ober, Jacob Schewe, Susana Adamo, Brent McCusker, Silke Heuser and Amelia Midgley, "Preparing for Internal Climate Migration", Washington, D.C.: World Bank, 19 March 2018, https://openknowledge.worldbank.org/entities/publication/2be91c76-d023-5809-9c94-d41b71c25635.

22 International Organization for Migration (IOM), "A Complex Nexus", IOM, https://www.iom.int/complex-nexus.

23 Jeetendra P. Aryal, Pradyumna Raj Pandeya, Mahesh Kumar Ghimire and Tek B. Sapkota, "Climate Change and Agriculture in South Asia: Adaptation Options in Smallholder Production Systems", *Environment, Development and Sustainability*, 21, no. 2, 16 April 2019, https://link.springer.com/article/10.1007/s10668-019-00414-4.

24 Walimuni Chamindri Sewanka Mendis Abeysekara, Mahinda Siriwardana and Samuel Meng, "Economic Consequences of Climate Change Impacts on South Asian Agriculture: A Computable General Equilibrium Analysis", *Australian Journal of Agricultural and Resource Economics*, 68, no. 1, 27 November 2023, https://doi.org/10.1111/1467-8489.12541.

undernourished people, making it the hungriest globally.[25] The informal sector, mostly small and micro enterprises, employs nearly 75 per cent of non-agricultural workers – the highest share among developing regions.[26]

This exposes businesses and workers to financial shocks from sudden losses in a region where at least half the population – 750 million – have faced one or more climate-related disasters in the past 20 years.[27] South Asia is projected to suffer a median income loss of 22 per cent by 2050 due to climate change.[28]

South Asia is projected to suffer a median income loss of 22 per cent by 2050 due to climate change.

South Asia houses a third of the world's extreme poor – 389 million of 1.1 billion globally.[29] While extreme poverty is lower than in low-income countries, Bangladesh, India and Nepal have higher rates than emerging market economies. According to the World Bank (April 2025), India's extreme poverty rate is 2.3 per cent (US$2.15/day [S$2.90/day], 2017 purchasing power parity), but its large population means about 75 million remain in extreme poverty, with four-fifths of the region's poor in India.[30]

Fossil fuels dominate South Asia's energy, providing 80 per cent of production, two-thirds of it through imports.[31] With its population expected to reach 2.3 billion by 2050, the region faces the challenge of

25 "South Asia", *Global Hunger Index*, October 2024, https://www.globalhungerindex.org/regions/south-asia.html.

26 Maurizio Bussolo and Siddharth Sharma (eds), "Hidden Potential: Rethinking Informality in South Asia", *South Asia Development Forum*, Washington, D.C.: World Bank, 30 June 2022, https://openknowledge.worldbank.org/handle/10986/37175.

27 "Integrating Climate and Development in South Asia", (Washington, D.C.: World Bank, December 2024), https://www.worldbank.org/en/region/sar/brief/integrating-climate-and-development-in-south-asia/integrating-climate-and-development-in-south-asia-region.

28 Maximilian Kotz, Anders Levermann and Leonie Wenz, "The Economic Commitment of Climate Change", *Nature*, no. 7955, 17 April 2024, https://doi.org/10.1038/s41586-024-07219-0.

29 Sabina Alkire, Ines Belchior, Marjan Blumberg, et al., *Global Multidimensional Poverty Index 2023: Unstacking Global Poverty – Data for High-impact Action*, New York: United Nations Development Programme, 11 July 2023, https://ophi.org.uk/sites/default/files/2024-02/GMPI_2023_Unstacking.pdf.

30 Bazlul Haque Khondker and Emmanouil Kitsios, "Social Protection Reforms in South Asia", *South Asia's Path to Resilient Growth*, edited by Klaus-Peter Hellwig, (Washington, D.C.: International Monetary Fund, 16 June 2022), 93–122, https://doi.org/10.5089/9781513587219.071.

31 Guangzhe Chen, "An Integrated Electricity Market in South Asia Is Key to Energy Security", *World Bank Blogs*, 19 July 2022, https://blogs.worldbank.org/en/endpovertyinsouthasia/integrated-electricity-market-south-asia-key-energy-security.

meeting growing energy needs while transitioning to cleaner sources.[32] This dual imperative highlights the conflict between urgent economic needs and the long-term goal of mitigating climate risks in one of the world's most vulnerable regions.

Geopolitical Tensions

China, as the upper riparian neighbour, shares the Indus and Brahmaputra waters.

In South Asia, nuclear-armed rivals India and Pakistan share river basins with their larger nuclear-capable neighbour China, creating a complex riparian neighbourhood.[33] This region faces geopolitical risks rooted in the historical partition of India, Pakistan and Bangladesh, alongside ongoing deep-rooted conflicts between India-China and India-Pakistan. India, Pakistan, Nepal, Bhutan and Bangladesh share at least four major river basins – Indus, Ganges-Brahmaputra-Meghna, Karnaphuli-Teesta and Mahakali-Gandak.[34] China, as the upper riparian neighbour, shares the Indus and Brahmaputra waters.[35]

Sharing waters in the fragile Hindu Kush-Himalayan ecosystem has complicated climate adaptation.[36] Tensions over dwindling river waters and dam building in the Indus and Brahmaputra basins have risen in the past decade. More importantly, rapid glacial retreat now threatens freshwater for millions in India, Nepal and Pakistan.[37]

32 Kanta Kumari Rigaud, Alex de Sherbinin, Bryan Jones, Jonas Bergmann, Viviane Clement, Kayly Ober, Jacob Schewe, Susana Adamo, Brent McCusker, Silke Heuser and Amelia Midgley, "Preparing for Internal Climate Migration", Washington, D.C.: World Bank, 19 March 2018, https://openknowledge.worldbank.org/entities/publication/2be91c76-d023-5809-9c94-d41b71c25635

33 Archana Chaudhary and Faseeh Mangi, "New Weather Patterns Are Turning Water Into a Weapon", *Bloomberg*, 16 January 2020, https://www.bloomberg.com/features/2020-indus-river/.

34 Ambika Vishwanath, "Paddling Upstream: Transboundary Water Politics in South Asia", *Carnegie India*, 01 October 2018, https://carnegieendowment.org/files/Viashwanath_GBM_Basin_October_2018.pdf.

35 Uttam Kumar Sinha, "India-China Riparian Relations: Of Reality and Rationality", *Journal of the United Service Institution of India*, No. 612, 30 June 2018, https://www.usiofindia.org/publication-journal/india-china-riparian-relations-of-reality-and-rationality.html.

36 Santosh K. Rai, Rouf A. Shah and Satyabrata Das, "Cooperative Management of Himalayan Rivers Among the Riparian States", *Water Resource Management in the Himalayas*, edited by John Doe, (New York: Elsevier, 31 October 2023), 123-150, https://www.sciencedirect.com/science/article/abs/pii/B9780323853781000052.

37 Anjal Prakash, "Retreating Glaciers and Water Flows in the Himalayas: Implications for Governance", *ORF Online*, 11 May 2023, https://www.orfonline.org/research/retreating-glaciers-and-water-flows-in-the-himalayas-implications-for-governance/..

Roots of the Polycrisis

In geopolitical and geo-economic terms, the 2020s have been a fraught decade beginning with a global pandemic that left economies reeling.[38] Growing income inequalities exposed weaknesses in global governance and increased debt burdens for developing nations.[39] In addition, poor countries have an increased interest burden from funds received to fight climate change.

Growing income inequalities exposed weaknesses in global governance and increased debt burdens for developing nations.

In 2022, grants formed only 28 per cent of climate finance to developing nations recovering from floods or transitioning to clean energy; the rest were loans, adding to their external debt. Fifty-eight countries repaid US$59 billion (S$79.65 billion) in debts – more than double the US$28 billion (S$37.8 billion) received in climate finance.[40]

The 2020s deepened the bitter strategic rivalry between the United States (US) and China.[41] As the world emerged from the pandemic, Russia's invasion of Ukraine in early 2022 sent geopolitical shockwaves worldwide.[42] This was followed by coups in West Africa and military

38 James D. Ford, Carol Zavaleta-Cortijo, Triphini Ainembabazi, Cecilia Anza-Ramirez, Ingrid Arotoma-Rojas, Joana Bezerra, et al., "Interactions between Climate and COVID-19", *The Lancet Planetary Health* 6, no. 10, October 2022, https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(22)00174-7/fulltext; and "Introduction: The Economic Impacts of the COVID-19 Crisis", In *World Development Report 2022: Finance for an Equitable Recovery*, Washington, D.C.: World Bank, 2022, pp 1-20, https://www.worldbank.org/en/publication/wdr2022/brief/chapter-1-introduction-the-economic-impacts-of-the-covid-19-crisis.

39 Kaamil Ahmed, "Growth of Gulf Between Rich and Poor Countries 'Recipe for Much Darker Future,' Says UN", *The Guardian*, 13 March 2024, https://www.theguardian.com/global-development/2024/mar/13/growth-of-gulf-between-rich-and-poor-countries-recipe-for-much-darker-future-says-un; and Tom Bernes et al, "Challenges of Global Governance Amid the COVID-19 Pandemic", Council on Foreign Relations, 07 May 2020, https://cdn.cfr.org/sites/default/files/report_pdf/challenges-of-global-governance-amid-the-covid-19-pandemic.pdf; Amy Borrett, "The Pandemic's Stark Legacy: Widening Inequality Between Countries", *Financial Times*, 13 March 2024, https://www.ft.com/content/fee3dd30-c6ab-4063-b561-27c0f553e8a5.

40 International Institute for Environment and Development (IIED), "World's Least Developed Countries Spend Twice as Much Servicing Debts as They Receive in Climate Finance", Press release, (London: International Institute for Environment and Development, 16 October 2024), https://www.iied.org/worlds-least-developed-countries-spend-twice-much-servicing-debts-they-receive-climate-finance.

41 Francis Fukuyama, Ben Horton, John Kampfner and Hongying Wang, "Undercurrents: The US-China Rivalry in an Age of Crisis", Audio, 54:00, *Chatham House*, 14 January 2022, https://www.chathamhouse.org/2022/01/undercurrents-us-china-rivalry-age-crisis; Bonnie S. Glaser, "US-China Competition", *Lowy Institute*, https://interactives.lowyinstitute.org/features/covid19/issues/us-china/.

42 Matthew Chance, Nathan Hodge, Tim Lister, Laura Smith-Spark and Ivana Kottasová, "Peace in Europe 'Shattered' as Russia Invades Ukraine", *CNN*, 24 February 2022, https://edition.cnn.com/2022/02/24/europe/ukraine-russia-invasion-thursday-intl/index.html.

clashes between India and Pakistan, Israel and Iran and the smouldering conflict in Palestine.[43]

Climate change's growing impacts disproportionately harm the world's most vulnerable, exacerbating global insecurity amid a weak economy.

Climate change's growing impacts disproportionately harm the world's most vulnerable, exacerbating global insecurity amid a weak economy.[44] The World Bank forecasts modest global growth of 2.3 per cent in 2025 and a slow recovery to 2.6 per cent in 2026, levels insufficient to significantly reduce poverty in developing countries.[45]

This polycrisis – driven by energy, food and economic insecurity – has stalled fragile progress in global climate cooperation, a cornerstone for aligning economic and trade policies with long-term commitments made by nations worldwide, including South Asia, at the United Nations (UN) Framework Convention on Climate Change (UNFCCC).[46]

Historical Stance

Yet, despite complex climate challenges and fossil fuel dependence, South Asia contributes relatively little to global greenhouse gas emissions.[47] Its contribution was a mere 9.6 per cent in 2023, with India accounting for 7.8 per cent.[48]

And unlike in some developed nations, including the US and the European Union (EU), climate denial is not part of the political rhetoric

43 Rédaction Africanews, "Africa: The 7 Military Coups Over the Last Three Years", *Africanews*, 30 August 2023, https://www.africanews.com/2023/08/30/africa-the-7-military-coups-over-the-last-three-years/; and NPR, "Middle East Crisis", *NPR*, accessed January 2025, https://www.npr.org/series/1205445976/middle-east-crisis.

44 Joan Michelson, "How Climate Change Is Reshaping Global Security and the Military", *Forbes*, 18 October 2024, https://www.forbes.com/sites/joanmichelson2/2024/10/18/how-climate-change-is-reshaping-global-security-and-the-military/.

45 Paul Wiseman, "World Bank Says the Global Economy Is Growing Steadily, but Not Fast Enough to Help Ease Poverty", *AP News*, 16 January 2025, https://apnews.com/article/world-economy-developing-protectionist-poverty-76d7a2bb172e519d411483350abbfbfe.

46 Max Bergmann, Cy McGeady, Otto Svendsen, Mathias Zacarias and Ignacio Urbasos, "Power Plays: Europe's Response to the Energy Crisis", Center for Strategic and International Studies (CSIS), September 2024, https://csis-website-prod.s3.amazonaws.com/s3fs-public/2024-09/240903_Bergmann_Power_Crisis.pdf?VersionId=2ge2hwdyWP79graodpVTsz95vY.t_CeS; United Nations Framework Convention on Climate Change (UNFCCC), "Nationally Determined Contributions (NDCs)", https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs.

47 Oliver Gordon, "Fossil Fuel Subsidies Doubled in 2021 – OECD and IEA", *Energy Monitor*, 1 September 2022, https://www.energymonitor.ai/finance/fossil-fuel-subsidies-doubled-in-2021-oecd-iea/.

48 European Commission, Joint Research Centre (JRC), "GHG Emissions of All World Countries: 2024 Report", *Emissions Database for Global Atmospheric Research (EDGAR)*, 2024, https://publications.jrc.ec.europa.eu/repository/handle/JRC143227.

in South Asia.[49] The region has backed environmental policies since the UN Conference on the Human Environment held in Stockholm in 1972, the first such global meeting.[50]

The region has backed environmental policies since the UN Conference on the Human Environment held in Stockholm in 1972, the first such global meeting.

Even then, India, along with Libya, had proposed "an international fund or a financial institution whose primary operative objectives will be to assist (economically poorer countries) in strengthening of national programmes in this field through the provision of seed capital and the extension of the necessary technical assistance to enable an effective mobilisation of domestic resources for housing and the environmental improvement of human settlements."[51]

They argued that poverty and lack of resources in developing countries are the core environmental issues hindering economic development without environmental harm.

India's stand, recorded in the document, clearly states that "The need of developing countries was not expertise but resources, and the Conference should offer solutions, not diagnoses."[52]

This stance has remained consistent for more than five decades.[53] The country and its South Asian counterparts formulated national policies and established governance structures to deal with climate change since joining the United Nations Framework Convention on Climate Change (UNFCCC), adopted in 1992 with the aim of preventing dangerous human interference with fragile natural systems.[54]

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49 Kat So, "Climate Deniers of the 118th Congress", *Center for American Progress*, 18 July 2024, https://www.americanprogress.org/article/climate-deniers-of-the-118th-congress/.

50 Pamela Chasek, "The Legacies of the Stockholm Conference", *International Institute for Sustainable Development*, 1 June 2022, https://www.iisd.org/articles/deep-dive/stockholm-conference-legacy.

51 United Nations, *Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972*, New York: United Nations, 1973, https://documents.un.org/doc/undoc/gen/nl7/300/05/pdf/nl730005.pdf.

52 Ibid.

53 Press Information Bureau, "India Delivers Statement on Behalf of Like-Minded Developing Countries at the High-Level Ministerial on Climate Finance in CoP29 Summit at Baku, Azerbaijan", Ministry of Environment, Forest and Climate Change, Government of India, 15 November 2024, https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2073601

54 Ministry of Climate Change and Environmental Coordination, Government of Pakistan, *National Climate Change Policy 2021*, Islamabad: Government of Pakistan, 2021, https://mocc.gov.pk/SiteImage/Policy/NCCP%20Report.pdf; National Environment Commission, "About Us", National Environment Commission, Royal Government of Bhutan, 10 October 2023, http://www.nec.gov.bt/aboutus; "United Nations Framework Convention on Climate Change", United Nations, 1992, http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf.

At the last meeting of the Conference of Parties (COP) 29 in November 2024, developing nations, especially India, demanded larger financial commitments from developed countries under the New Common Quantified Goal (NCQG), frustrated by decades of delay.[55]

Climate agreements centre on annual talks at three key UN conventions formed after the 1992 Rio Earth Summit: the UNFCCC, the Convention on Biological Diversity and the UN Convention to Combat Desertification.[56]

The negotiations over fair carbon space shares between developed and developing countries at the UNFCCC often involve political tensions due to crosscutting discussions and financial commitments.

Among these, the UNFCCC's COP29 is most significant. The negotiations over fair carbon space shares between developed and developing countries at the UNFCCC often involve political tensions due to crosscutting discussions and financial commitments.[57] Annual UNFCCC COP meetings shape key policies on energy, mobility, health, food security and finance for developed and developing countries, including South Asia.[58] Governments base emissions targets, renewable energy growth, climate finance and adaptation plans on frameworks like the Kyoto Protocol and Paris Agreement. They promote net-zero goals, higher climate ambition and climate justice integration, though implementation often faces financial and political challenges.

For decades, rich and poor developing nations, including those in South Asia, have clashed over who should fund climate solutions. The core issue lies in differing views on accountability for the worsening crisis: developed countries often prioritise profit-driven solutions, while

55 "UN Climate Change Conference Baku - November 2024", United Nations Framework Convention on Climate Change (UNFCCC), 10 October 2023, https://unfccc.int/cop29; Jayashree Nandi, "India Makes History at COP29, Rejects NCQG Decision, Speaks Up for Global South", *Hindustan Times*, 24 November 2024,https://www.hindustantimes.com/environment/india-makes-history-at-cop29-rejects-ncqg-decision-speaks-up-for-global-south-101732422329955.html; Upamanyu Das and Avantika Goswami, "The Great Escape from Baku: Global North Abandons South, Denies Adequate Climate Finance at COP29", *Down To Earth*, 24 November 2024, https://www.downtoearth.org.in/climate-change/the-great-escape-from-baku-global-north-abandons-south-denies-adequate-climate-finance-at-cop29.

56 International Institute for Sustainable Development, "The Contested Legacy of Rio+20", *SDG Knowledge Hub*, Policy Brief, 20 September 2012, https://sdg.iisd.org/commentary/guest-articles/the-contested-legacy-of-rio20/.

57 Martin Khor, "The Equitable Sharing of Atmospheric and Development Space: Summary", Paper presented at the United Nations Framework Convention on Climate Change (UNFCCC) AWG-LCA workshop on Equity, UNFCC: Bonn, 16 May 2012, https://unfccc.int/sites/default/files/20120516_south_centre_paper_1701.pdf.

58 Coalition of Finance Ministers for Climate Change, "COP26: Mainstreaming Report, Mainstreaming Climate into Economic and Financial Policies", Prepared for the 2021 UN Climate Change Conference (COP26), 3 November 2021, https://www.financeministersforclimate.org/sites/default/files/2021-11/COP26%20Mainstreaming%20Report.pdf.

developing nations emphasise equitable, need-based approaches to addressing climate change. Developed and developing nations approach climate talks differently, shaped by their economic worldview.[59] Poorer countries stress that developed nations, responsible for 92 per cent of historical emissions under the UNFCCC's Article 3.1, should bear a greater burden in addressing climate change.[60] In contrast, richer nations have been reluctant to fully acknowledge or act on their historical responsibility, as noted by scholars Tejal Kanitkar and T. Jayaraman.[61] Adding weight to calls for climate justice is the fact that many developed countries were colonial powers until the last century and contributed to the impoverishment of developing regions in South Asia, Africa and Latin America.

Developed and developing nations approach climate talks differently, shaped by their economic worldview.

Developing nations, including South Asia, argue that developed countries should take greater responsibility for achieving net-negative carbon emissions, based on historical responsibility, current capacity and climate justice.[62] They emphasise that industrialised nations, as primary emitters, have more technological and economic resources and a moral duty to support vulnerable countries disproportionately affected by climate impacts, especially under the UNFCCC's Article 3.2.[63]

Developed nations frame their responsibility as one toward future generation, but their climate actions are seen as inadequate and inequitable.[64] A major contention is the gap between their financial

59 Christian Dorninger et al., "Global Patterns of Ecologically Unequal Exchange: Implications for Sustainability in the 21st Century", *Ecological Economics* 179, January 2021, https://doi.org/10.1016/j.ecolecon.2020.106824.

60 Jason Hickel, "Quantifying National Responsibility for Climate Breakdown: An Equality-Based Attribution Approach for Carbon Dioxide Emissions in Excess of the Planetary Boundary", *The Lancet Planetary Health*, September 2020, https://doi.org/10.1016/S2542-5196(20)30196-0.

61 Tejal Kanitkar and T. Jayaraman, "Equity in Long-Term Mitigation", in *India in a Warming World: Integrating Climate Change and Development*, ed. Navroz K. Dubash, (Oxford University Press, 2019), 92–113, https://doi.org/10.1093/oso/9780199498734.003.0006.

62 Ankur Malyan and Vaibhav Chaturvedi, "The Carbon Space Implications of Net Negative Targets", Policy Brief, Council on Energy, Environment and Water (CEEW), 3 November 2021, https://www.ceew.in/publications/implications-of-negative-carbon-emissions-on-global-carbon-budget-space.

63 Rishika Pardikar, "Global North Is Responsible for 92% of Excess Emissions", *Eos*, 28 October 2020, https://eos.org/articles/global-north-is-responsible-for-92-of-excess-emissions.

64 Catherine Redgwell, "Principles and Emerging Norms in International Law: Intra- and Inter-generational Equity", In *International Law and the Environment*, edited by Alan Boyle and Catherine Redgwell, 185–201, (Oxford University Press, 2 November 2016), https://doi.org/10.1093/law/9780199684601.003.0009.

pledges and the actual needs of developing nations, which are still viewed primarily as mere sources of raw materials and markets.[65]

Deepening Fissures

The growing rift between developed and developing nations at the UNFCCC over who pays for the devastating impacts of carbon emissions has become a major economic risk this decade.[66] The fissures have widened over time and examining them could help better understand how geopolitical and economic risks for South Asia are stacking up.

Principles and Process

It also formalised civil society's role through non-party stakeholder inputs.

The UNFCCC, with 197 nations representing over 99 per cent of the global population, is among the most ambitious global political efforts to combat climate change. It redefined international cooperation though consensus-driven negotiations, granting equal political influence regardless of national size or wealth, unlike past pacts. It also formalised civil society's role through non-party stakeholder inputs.[67] The UNFCCC's negotiations involve three steps: fact-finding based on climate science, technical discussions and political bargaining to reach universal agreement.

Differentiation and Climate Action

While the UNFCCC's consensus mechanism ensured equal footing for all countries, over time, collective bargaining became a key driver in shaping negotiation texts – groups of countries aligned by mutual interests, shared principles, or similar developmental priorities – alongside their individual positions. And blocs like the Group of Seven, the Group of

65 Jason Hickel, Dylan Sullivan and Huzaifa Zoomkawala, "Rich Countries Drained $152tn from the Global South Since 1960", *Al Jazeera*, 6 May 2021, https://www.aljazeera.com/opinions/2021/5/6/rich-countries-drained-152tn-from-the-global-south-since-1960.

66 Sinan Ülgen, "How Deep Is the North-South Divide on Climate Negotiations?" *Carnegie Europe*, 6 October 2021, https://carnegieendowment.org/research/2021/10/how-deep-is-the-north-south-divide-on-climate-negotiations?lang=en.

67 Daniel Bodansky, "Evolving Functions of the UNFCCC", Center for Climate and Energy Solutions (C2ES), November 2019, https://www.c2es.org/wp-content/uploads/2019/11/evolving-functions-of-the-unfccc.pdf; Amin Mohseni-Cheraghlou, "Democratic Challenges at Bretton Woods Institutions", *Econographics* (blog), Atlantic Council, 11 April 2022, https://www.atlanticcouncil.org/blogs/econographics/inequality-at-the-top-democratic-challenges-at-bretton-woods-institutions/.

77+China (G77+China), least developed countries and small island developing states quickly became dominant.[68] The South Asian nations, especially India, play a pivotal role in these alliances.[69]

The South Asian nations, especially India, play a pivotal role in these alliances.

The first decade of talks established two main climate action areas: adaptation (adjusting to impacts) and mitigation (cutting emissions) and sparked contentious funding debates central to climate finance.[70] Between 1998 and 2000, annual bilateral climate aid from the Organisation for Economic Co-operation and Development countries averaged US$2.7 billion (S$3.65 billion).[71]

Article 3 of the Convention enshrined equity and common but differentiated responsibilities and respective capabilities (CBDR-RC), mandating developed nations, as historical emitters, to lead mitigation.

Developing countries retained growth priorities, protected by sovereignty clauses that forbid unilateral trade or economic barriers. Yet, developed nations have attempted to shift responsibilities onto poorer countries.[72]

At COP26 (Glasgow, 2021) and subsequent conferences, they pushed for a global coal and fossil fuel phase-out without fully addressing

68 "What Does the G7 Do?", Council on Foreign Relations, 24 June 2024, https://www.cfr.org/backgrounder/what-does-g7-do; Group of 77 and China, "Third South Summit Outcome Document", Kampala, Uganda, 21-22 January 2024, http://www.g77.org/doc/3southsummit_outcome.htm; United Nations Department of Economic and Social Affairs, "About the LDC Category", UN Development Policy and Analysis Division, 10 October 2023, https://www.un.org/development/desa/dpad/least-developed-country-category.html; and United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, "About Small Island Developing States", UN-OHRLLS, 10 October 2023, https://www.un.org/ohrlls/content/about-small-island-developing-states.

69 Jesmine Ahmed, "Mapping India's Position in United Nations Framework Convention on Climate Change Conferences (UNFCCC) – With Special Reference to COP-26", *Russian Law Journal*, No. 5s, April 2023, https://cyberleninka.ru/article/n/mapping-india-s-position-in-united-nations-framework-convention-on-climate-change-conferences-unfccc-with-special-reference-to-cop.

70 United Nations Framework Convention on Climate Change (UNFCCC), *The First Ten Years*, (New York: Climate Change Secretariat, 2004), https://unfccc.int/resource/docs/publications/first_ten_years_en.pdf; United Nations Framework Convention on Climate Change (UNFCCC), "Global Goal on Adaptation", https://unfccc.int/topics/adaptation-and-resilience/workstreams/gga; United Nations Framework Convention on Climate Change (UNFCCC), "Introduction to Mitigation", accessed 10 October 2023, https://unfccc.int/topics/introduction-to-mitigation.

71 Organisation for Economic Co-operation and Development (OECD), "Climate Change", *OECD*, 2 February 2025, https://www.oecd.org/en/topics/policy-areas/climate-change.html; United Nations Framework Convention on Climate Change (UNFCCC), *United Nations Framework Convention on Climate Change: Handbook*, (Bonn: Climate Change Secretariat, 2006), https://unfccc.int/resource/docs/publications/handbook.pdf.

72 Meena Raman, "UNFCCC COPs – A Tale of Broken Promises and Shifting Goalposts", *Third World Resurgence*, no. 348, 2021, https://twn.my/title2/resurgence/2021/348/cover01.htm.

their own historical dependence or providing sufficient financial and technological support for developing countries' transitions, violating the CBDR-RC principle. Meanwhile, their US $100 billion (S$ 135 billion) commitment to developing nations was delayed and often increased recipient countries' debt burdens through interest-bearing loans and investments.[73]

Kyoto Protocol and Paris Agreement

Extended via the Doha Amendment, Kyoto targeted an 18 per cent reduction by 2020.

The Kyoto Protocol (1997) operationalised the UNFCCC's differentiation principle by imposing binding emissions-reduction targets on 37 industrialised nations while exempting developing countries.[74] Extended via the Doha Amendment, Kyoto targeted an 18 per cent reduction by 2020.[75] However, it met limited success as key players like the US, Canada and Russia opted out.

The 2015 Paris Agreement redefined the CBDR-RC by expanding responsibilities to all nations, with voluntary nationally determined contributions (NDCs) reviewed every five years.[76] It set a global temperature goal – limiting warming to 2 degrees Celsius, aiming for 1.5 degrees Celsius – and introduced "national circumstances" as a qualifier to the CBDR-RC, allowing situational dynamics to influence climate responsibilities. Meanwhile, the US$100 billion (S$135 billion) annual climate finance goal for developed nations to aid developing countries, set in 2009, remained unmet until 2022.[77]

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73 "Climate Finance Short-Changed, 2024 Update", *OXFAM Methodology Note*, June 2024, https://www.oxfamnovib.nl/Files/rapporten/2024/Climate%20Finance%20Short-Changed%202024.pdf

74 United Nations Framework Convention on Climate Change (UNFCC), "Kyoto Protocol to the United Nations Framework Convention on Climate Change", Kyoto Climate Change Conference - December 1997, 10 December 1997, https://unfccc.int/documents/2409.

75 United Nations Framework Convention on Climate Change (UNFCCC), "Doha Amendment to the Kyoto Protocol", 8 December 2012, https://unfccc.int/files/kyoto_protocol/application/pdf/kp_doha_amendment_english.pdf.

76 United Nations, *Paris Agreement*, (Paris: United Nations, 12 December 2015), https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

77 United Nations Framework Convention on Climate Change (UNFCCC) Standing Committee on Finance, "Report on Progress Towards Achieving the Goal of Mobilizing Jointly USD 100 Billion Per Year to Address the Needs of Developing Countries in the Context of Meaningful Mitigation Actions and Transparency on Implementation", (Bonn: United Nations Framework Convention on Climate Change, 2022), https://unfccc.int/sites/default/files/resource/J0156_UNFCCC%20100BN%202022%20Report_Book_v3.2.pdf.

National Commitments

The South Asian nations have largely stood together within international climate negotiations, particularly under the G77+China coalition. They have also placed a strong focus on adaptation measures in their NDCs to tackle climate challenges like floods, droughts and rising sea levels.[78] This remains central to South Asia as without effective adaptation, climate change could shave off about 1.8 per cent of the region's annual GDP by 2050, escalating to 8.8 per cent by 2100.[79]

Many commitments are conditional, depending on international support through finance, technology and capacity-building. South Asia's NDCs largely align with the Sustainable Development Goals, integrating climate action with economic growth and poverty reduction.[80]

Many commitments are conditional, depending on international support through finance, technology and capacity-building.

India aims to cut its GDP emissions intensity by 45 per cent from 2005 levels and generate half its energy from non-fossil sources by 2030.[81] Nepal targets reducing fossil fuel reliance by increasing electric vehicles to 20 per cent by 2020 and meeting half its energy needs with renewables by 2050.[82]

Bhutan remains carbon-negative and has pledged to maintain its carbon neutrality.[83] Pakistan's NDCs include a conditional goal to cut projected emissions by up to 20 per cent by 2030, provided it receives international support.[84] Sri Lanka aims to lower energy-related emissions by 20 per

78 United Nations Framework Convention on Climate Change (UNFCCC), "NDC Registry", (Bonn: UNFCCC, 10 October 2023), https://unfccc.int/NDCREG.

79 Jeetendra Prakash Aryal, Tek B. Sapkota, Ritika Khurana, et al., "Climate Change and Agriculture in South Asia: Adaptation Options in Smallholder Production Systems", *Environment, Development and Sustainability* 22, 2020, https://doi.org/10.1007/s10668-019-00414-4.

80 United Nations Framework Convention on Climate Change (UNFCCC), "Action on Climate and SDGs", UNFCCC, https://unfccc.int/topics/cooperative-activities-and-sdgs/action-on-climate-and-sdgs.

81 Government of India, *India's Updated First Nationally Determined Contribution Under the Paris Agreement (2021-2030)*, Policy Brief, (New Delhi: Government of India, August 2022), https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf.

82 Government of Nepal, *Second Nationally Determined Contribution (NDC)*, (Kathmandu: Government of Nepal, December 2020), https://unfccc.int/sites/default/files/NDC/2022-06/Second%20Nationally%20Determined%20Contribution%20(NDC)%20-%202020.pdf.

83 Royal Government of Bhutan, *Second Nationally Determined Contribution*, (Thimphu: Royal Government of Bhutan, 5 June 2021), https://unfccc.int/sites/default/files/NDC/2022-06/Second%20NDC%20Bhutan.pdf.

84 Government of Pakistan, *Pakistan's Updated Nationally Determined Contribution 2021*, Islamabad: Government of Pakistan, October 2021, https://unfccc.int/sites/default/files/NDC/2022-06/Pakistan%20Updated%20NDC%202021.pdf.

Afghanistan's commitments focus on increasing renewable energy to 10 per cent of its energy mix by 2030.

cent compared to a business-as-usual scenario by 2030, with a target of achieving 100 per cent renewable power generation by 2050.[85] Afghanistan's commitments focus on increasing renewable energy to 10 per cent of its energy mix by 2030.[86] Meanwhile, Bangladesh has set an unconditional goal to reduce greenhouse gas emissions by five per cent and aims for a conditional reduction of up to 15 per cent by 2030 across the power, transport and industry sectors.[87]

Finance Access

Achieving these targets requires major transformations in each nation's energy and transport systems. The International Finance Corporation estimates that by 2030, South Asia will need investments worth over US$410 billion (S$553.5 billion) for renewable energy, US$670 billion (S$904.5 billion) for greener vehicle fleets and more than US$1.5 trillion (S$2.03 trillion) for sustainable, resilient buildings.[88]

However, national projections vary; for instance, India estimates it will need up to US$2.5 trillion (S$3.38 trillion) to fund its climate initiatives by 2030.[89] South Asia's largest country has heavily invested in clean technologies over the past two decades to meet its climate commitments.[90]

However, with annual disaster-related losses in South and South-West Asia now exceeding US$153 billion (S$206.55 billion) – more than twice

85 Asian Disaster Preparedness Center, "Implementation of the Nationally Determined Contributions in Sri Lanka: Updates, Issues and Options", 2023, https://www.adpc.net/igo/category/ID1854/doc/2023-uaq1Tg-ADPC-NDCSriLankaForWeb.pdf.

86 Islamic Republic of Afghanistan, "Intended Nationally Determined Contribution, Submission to the United Nations Framework Convention on Climate Change", 21 September 2015, https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Afghanistan%20First/INDC_AFG_20150927_FINAL.pdf.

87 Government of Bangladesh, *Bangladesh's First Nationally Determined Contribution (Updated Submission)*, (Government of Bangladesh, August 2021), https://unfccc.int/sites/default/files/NDC/2022-06/NDC_submission_20210826revised.pdf.

88 International Finance Corporation (IFC), *Climate Investment Opportunities in South Asia: An IFC Analysis*, Washington, D.C., International Finance Corporation, 2017, https://www.ifc.org/content/dam/ifc/doc/mgrt/climate-investment-opportunities-in-south-asia-an-ifc-analysis.pdf.

89 Government of India, "Lok Sabha Unstarred Question No. 3166", (New Delhi: Lok Sabha Secretariat, 16 March 2018), https://eparlib.sansad.in/bitstream/123456789/771382/1/AU3166.pdf.

90 Ministry of New and Renewable Energy, Government of India, "India's Renewable Energy Capacity Hits New Milestone: Renewable Energy Now Constitutes More Than 46.3% of Total Capacity", *Press Information Bureau (PIB)*, Delhi, 13 November 2024, https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2073038.

the previous estimates – these countries cannot bear the high costs of clean technology without financial aid.[91]

The legacy of colonialism, which extracted wealth from these former colonies, has left developing nations without the economic buffers needed today to rebuild and adapt amid intensifying climate impacts.[92]

The legacy of colonialism, which extracted wealth from these former colonies, has left developing nations without the economic buffers needed today to rebuild and adapt amid intensifying climate impacts.

As climate impacts worsen, developing countries in South Asia, Africa and Latin America have grown frustrated with the reluctance of developed nations – most of them former colonisers – to provide meaningful support beyond profit-driven measures or market-rate loans. A 2024 review by *Reuters* and Stanford's *Big Local News* found that developed countries extended at least US$18 billion (S$24.3 billion) of climate finance to developing countries in market-rate loans rather than grants, funnelling back funds to the so-called donors through interest payments, lucrative work contracts and violating climate lending norms and adding to the recipients' debt burdens.[93] This includes US$10.2 billion (S$13.77 billion) from Japan, US$3.6 billion (S$4.86 billion) from France, US$1.9 billion (S$2.57 billion) from Germany and US$1.5 billion (S$2.03 billion) from the US.

According to Oxfam, wealthy nations short-changed low and middle-income countries by up to US$88 billion (S$118.8 billion) in 2022.[94] Although they claimed to have mobilised US$116 billion (S$156.6 billion) in climate finance – exceeding the US$100 billion (S$135 billion) annual target promised by 2020 – nearly US$92 billion (S$124.2 billion) came from public finance – 70 per cent were market-rate loans. Oxfam estimates the "true value" of this finance at only US$28-US$35 billion (S$37.8-S$47.25 billion), with just US$15 billion (S$20.25 billion) allocated for adaptation.

91 United Nations Economic and Social Commission for Asia and the Pacific, "The Disaster Riskscape Across South and South-West Asia: Key Takeaways for Stakeholders", New York: United Nations, 2020, https://www.unescap.org/sites/default/files/IDD-APDR-Subreport-SSWA.pdf.

92 Harriet Mercer and Thomas Simpson, "Imperialism, Colonialism and Climate Change Science", *WIREs Climate Change*, 14, no. 1, 21 June 2023, https://doi.org/10.1002/wcc.851.

93 Reuters, "Rich nations are earning billions from a pledge to help fix climate change", *Reuters Investigates*, 21 May 2024, https://www.reuters.com/investigates/special-report/climate-change-loans/.

94 Oxfam International, "Rich Countries Overstating 'True Value' of Climate Finance by Up to $88 Billion, Says Oxfam", *Oxfam International*, 9 July 2024, https://www.oxfam.org/en/press-releases/rich-countries-overstating-true-value-climate-finance-88-billion-says-oxfam.

Among the lowest per capita emitters, Nepal, Bhutan and Sri Lanka struggle to access climate finance to bolster resilience.

Weakening Multilateralism

It is against this backdrop that COP29 negotiators, in November-December 2024, struggled to bridge the gap between climate ambition and the actual funding available to Global South nations.

The NCQG, where rich nations agreed to provide US$300 billion (S$405 billion) for climate finance by 2035, fell far short of the US$1.3 trillion (S$1.76 trillion) that developing countries sought.[95] Since the goal does not commit to cheaper public funds or grants for South Asia and other developing nations, poorer countries will likely bear greater financial burdens to address climate challenges.

COP29 showed that while progress is possible, the fragmented global climate governance may be ill-suited to the rapidly accelerating challenges.

The breakthrough on international carbon markets, seen as a key step to globally incentivise emissions reductions, requires strict regulation to prevent loopholes that could undermine progress.[96] COP29 showed that while progress is possible, the fragmented global climate governance may be ill-suited to the rapidly accelerating challenges.

COP29's lacklustre outcomes were partly because of ongoing conflicts in Ukraine, Palestine and the then incoming presidency of Donald Trump, who has since prioritised fossil fuel expansion after withdrawing the US – the world's largest economy – from the Paris Agreement and UN climate finance commitments.[97] The US moves have deepened trust deficits in the climate process.[98]

95 Anushka Mohite and Vandita Sariya, "X Marks the Spot: How Power and Compromise Led to COP29's $300 bn Climate Finance Outcome", *Carbon Copy*, 26 November 2024, https://carboncopy.info/x-marks-the-spot-how-power-and-compromise-led-to-cop29s-300-bn-climate-finance-outcome/.

96 United Nations Framework Convention on Climate Change (UNFCCC), "COP29 Agrees International Carbon Market Standards", *UNFCCC*, 12 November 2024, https://unfccc.int/news/cop29-agrees-international-carbon-market-standards.

97 "COP29 Opens with Trump Climate Withdrawal Looming", *The Hindu*, 12 November 2024, https://www.thehindu.com/sci-tech/energy-and-environment/cop29-opens-with-trump-climate-withdrawal-looming/article68854487.ece.

98 Donald Trump, "Putting America First in International Environmental Agreements", The White House, 20 January 2025, https://www.whitehouse.gov/presidential-actions/2025/01/putting-america-first-in-international-environmental-agreements/.

Global institutions like the UN, originally created for post-World War II reconstruction of developed nations before shifting focus to aid poorer countries, have seen power increasingly shift away from wealthier countries as developing economies grow.[99] Processes at the UN, the World Bank, the International Monetary Fund (IMF) and the World Trade Organization have been undermined by declining democratic governance and rising nationalism, complicating their effectiveness. For South Asia, this weakening multilateralism has economic impacts, evident in US trade policies and the EU's controversial Carbon Border Adjustment Mechanism.[100]

For South Asia, this weakening multilateralism has economic impacts, evident in US trade policies and the EU's controversial Carbon Border Adjustment Mechanism.

Wealth Inequality

Rising libertarian opposition to climate regulations in major financial regions like the Americas and Europe, combined with weakening global economic structures and ongoing support for polluting industries, restricts critical international climate finance and cooperation, making South Asia's response to escalating climate risks far more difficult.[101]

In 2024, only 63 of 137 countries studied by the Bertelsmann Transformation Index remained democracies, with most classified as autocracies.[102] This decline coincides with rising wealth inequality and unprecedented income concentration among a few since the 2008

99 Abdessalam Jaldi, "The Crisis of Multilateralism Viewed from the Global South", *Policy Center for the New South*, April 2023, https://www.policycenter.ma/sites/default/files/2023-04/PP_05-23%20(Jaldi).pdf.

100 Badar Alam Iqbal, "The China-US Trade War and South Asian Economies", *ResearchGate*, December 2022, https://www.researchgate.net/publication/366588444_The_China-US_Trade_War_and_South_Asian_Economies; Alan Beattie, "A Crumbling System of Trade Rules Awaits Trump's Wrecking Ball", *Financial Times*, 15 November 2024, https://www.ft.com/content/68436c21-5b8e-4aab-b6bd-345a47340029; Joel Trachtman and Jan Yves Remy, "Comment: The EU's Carbon Border Tax Is a Blow to Climate Justice. Here's How to Fix It", *Reuters*, 15 November 2023, https://www.reuters.com/sustainability/boards-policy-regulation/comment-eus-carbon-border-tax-is-blow-climate-justice-heres-how-fix-it-2023-11-15/.

101 Olle Torpman, "Libertarianism and Climate Change", PhD dissertation, Stockholm University, 2016, https://www.su.se/polopoly_fs/1.279738.1461161241!/menu/standard/file/Torpman%20(2016)%20Libertarianism%20and%20Climate%20Change%20.

102 Bertelsmann Stiftung, *Bertelsmann Transformation Index (BTI) 2024: Governance in International Comparison*, Gütersloh: Verlag Bertelsmann Stiftung, 2024, https://www.bertelsmann-stiftung.de/fileadmin/files/BSt/Publikationen/imported/leseprobe/1_974_Leseprobe.pdf.

financial crisis.[103] Trump's actions are partly a symptomatic marker of excessive concentration of wealth and economic interests.[104]

The Way Forward: Trump, Trade and Tariffs

If the UN needs to be funded by billionaires, climate policy risks becoming a financialised space where resources are controlled by corporate interests

Rising financialisation of the global economy, driven by financial markets and private capital, will affect climate solutions. Decisions influenced by risk appetite, competition for returns and short-term pressures may prioritise projects with higher returns, sidelining vulnerable communities and countries that need support but are not "bankable" in business terms. If the UN needs to be funded by billionaires, climate policy risks becoming a financialised space where resources are controlled by corporate interests.[105]

Yet, it is becoming clearer that with the US pulling back from investing in clean technologies and large US investors shrinking from climate policies in tandem, the focus of developing nations, including those in South Asia, will inevitably have to rely on more domestic funding as well as bilateral and regional partnerships in Asia and the Global South for mitigation.[106]

The South Asian countries must increase investments in adaptation. Studies estimate that without effective adaptation, climate change could reduce South Asia's annual GDP by about 1.8 per cent by 2050, rising to

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103 James A. Anderson, "How Occupy Wall Street Changed Us, 10 Years Later", *TIME*, 15 November 2021, https://time.com/6117696/occupy-wall-street-10-years-later/.

104 Agence France-Presse, "Oligarchs Already Own Much of US—Can They Buy Democracy?", *The Economic Times*, 17 January 2025, https://economictimes.indiatimes.com/news/international/global-trends/oligarchs-already-own-much-of-us-can-they-buy-democracy/articleshow/117310998.cms. Bill Barrow, "Donald Trump's Cabinet Wealth: Billionaires and Influence", *Associated Press News,* 1 February 2025, https://apnews.com/article/donald-trumps-cabinet-wealth-billionaires-0d5147df74c7f0a851df296aeab2e164.

105 Harriet Reuter Hapgood, "Billionaire Michael Bloomberg to Fund UN Climate Change Body After US Exits Paris Agreement", *Euronews Green*, 24 January 2025, https://www.euronews.com/green/2025/01/24/billionaire-michael-bloomberg-to-fund-un-climate-change-body-after-us-exits-paris-agreemen.

106 "Climate Action Faces a Setback with Trump's Second Term; Momentum for Clean Energy Transition to Continue", *World Resources Institute*, 6 November 2024, https://www.wri.org/news/statement-climate-action-faces-setback-trumps-second-term-momentum-clean-energy-transition; Ross Kerber, "BlackRock Quits Climate Group as Wall Street Lowers Environmental Profile", *Reuters*, 9 January 2025, https://www.reuters.com/sustainability/blackrock-quits-climate-group-wall-streets-latest-environmental-step-back-2025-01-09/; "India, Japan Launch $600 Million Fund for Low Carbon Emission Projects", *Reuters*, 4 October 2023, https://www.reuters.com/sustainability/sustainable-finance-reporting/india-japan-launch-600-million-fund-low-carbon-emission-projects-2023-10-04/; Pooja Ramamurthi, "Alternate Paradigms: India's Role in Triangular Climate Cooperation", *Centre for Social and Economic Progress*, 18 October 2023, https://csep.org/reports/alternate-paradigms-indias-role-in-triangular-climate-cooperation/.

8.8 per cent by 2100.[107] With 2024 marking the hottest year on record and the first to breach the 1.5 degrees Celsius[108] warming threshold, alongside California's US$250 billion (S$337.5 billion) wildfire damages, investors are increasingly prioritising adaptation and resilience over mitigation to address urgent climate risks and capitalise on emerging market opportunities.[109]

Self-Reliance

The South Asian nations are taking the lead to provide indigenous solutions on the ground to address climate challenges. Their focus is on both mitigation and adaptation to safeguard their environments and economies. Here are some notable initiatives:

The South Asian nations are taking the lead to provide indigenous solutions on the ground to address climate challenges.

Renewable Energy Expansion

1. India's annual renewable capacity additions through 2030 are projected to grow faster than any major economy, including China, increasing over fourfold from 15 gigawatts (GW) in 2023 to 62 GW by 2030. Investments are expected to double to more than US$32 billion (S$43.2 billion) in 2025, with installed capacity reaching 205 GW by the end of 2024.[110]

107 Jeetendra Prakash Aryal, Tek B. Sapkota, Ritika Khurana, et al., "Climate Change and Agriculture in South Asia: Adaptation Options in Smallholder Production Systems", *Environment, Development and Sustainability* 22, 2020, https://doi.org/10.1007/s10668-019-00414-4.

108 Amitabh Sinha, "What Breaching 1.5°C Warming Threshold Means for the Earth, in 2025 and Beyond", *The Indian Express*, 12 January 2025, https://indianexpress.com/article/explained/explained-climate/what-breaching-1-5c-means-9772281/; Amitabh Sinha, "2024 Was Hottest Year Ever, Breached 1.5 Degree Celsius Warming Threshold", *The Indian Express*, 11 January 2025, https://indianexpress.com/article/world/climate-change/earth-records-hottest-year-ever-in-2024-breached-a-key-threshold-9770781/; Monica Danielle, "AccuWeather Estimates More Than $250 Billion in Damages and Economic Loss from LA Wildfires", *AccuWeather*, 14 January 2025, https://www.accuweather.com/en/weather-news/accuweather-estimates-more-than-250-billion-in-damages-and-economic-loss-from-la-wildfires/1733821.

109 Harriet Reuter Hapgood, "Billionaire Michael Bloomberg to Fund UN Climate Change Body After US Exits Paris Agreement", *Euronews Green*, 24 January 2025, https://www.euronews.com/green/2025/01/24/billionaire-michael-bloomberg-to-fund-un-climate-change-body-after-us-exits-paris-agreemen.

110 Press Trust of India, "India at High Table of Clean Energy Superpowers with Over 200 GW Capacity; Investments to Double in 2025", *Business Standard*, 31 December 2024, https://www.business-standard.com/industry/news/india-has-clean-energy-capacity-over-200-gw-investments-to-double-in-2025-124123100196_1.html.

Despite global pushback over its coal use, India is heavily investing in solar and wind energy to accelerate its clean energy transition.

The country targets net zero emissions by 2070 and aims to install 500 GW of renewable energy capacity by 2030, according to its NDCs under the Paris Agreement. It has already achieved 50 per cent of its electricity capacity from non-fossil fuel sources – five years ahead of its 2030 target. Despite global pushback over its coal use, India is heavily investing in solar and wind energy to accelerate its clean energy transition.[111]

Bangladesh is seeking renewable energy investments from Turkey and China to meet its clean energy goals.[112] It will need investments worth US$1.5-1.71 billion (S$2.03-S$2.31 billion) to achieve its target to meet 40 per cent of its energy needs through renewable sources by 2041.[113]

2. Pakistan, meanwhile, has also sought Chinese investments in its offshore wind projects to bridge the gap in the country's energy supplies.[114]

Climate-Resilient Agriculture

1. India is developing and distributing climate-resilient seed varieties designed to withstand extreme weather conditions, to beat climate-induced agricultural challenges and support farmers' incomes.[115]

2. Farmers in Nepal are shunning high-yielding crops like rice and wheat that are frequently disrupted by bad weather, to return to cultivating traditional crops like millets that can withstand climate vagaries.[116]

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111 Press Information Bureau, "India's Renewable Rise: Non-Fossil Sources Now Power Half of Installed Capacity", New Delhi: Government of India, 18 July 2025, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2144627.

112 "Turkey Seeks to Invest in Renewable Energy", *The Financial Express*, 10 January 2025, https://today.thefinancialexpress.com.bd/trade-market/turkey-seeks-to-invest-in-renewable-energy-1736445056; "Chinese Business Delegation Expresses Strong Interest in Investing in Bangladesh's Renewable Energy Sector", *The Business Standard*, 23 December 2024, https://www.tbsnews.net/bangladesh/energy/chinese-business-delegation-expresses-strong-interest-investing-bangladeshs.

113 "CPD Recommends Fund Creation to Boost Chinese Investment in Renewables", *The Business Standard*, 17 October 2024, https://www.tbsnews.net/bangladesh/what-bangladesh-needs-do-boost-chinese-investment-renewable-energy-cpds-recommendations.

114 Arab News, "Pakistan Invites Chinese Companies to Invest in Renewable Energy to Cut Reliance on Fuel Imports", *Arab News*, 18 November 2024, https://www.arabnews.com/node/2579721/pakistan.

115 Aniruddha Ghosal, "In India, Warming Climate Pressures Scientists to Keep Developing Tougher Seeds", *AP News*, 10 September 2024, https://apnews.com/article/climate-change-resilient-seeds-agriculture-india-drought-rains-587cf822c3000072584ba58562d2a321.

116 Pragati Shahi, "Climate Change Sees Nepalese Farmers Return to Indigenous Crops", *UCA News*, 18 December 2024, https://www.ucanews.com/news/climate-change-sees-nepalese-farmers-return-to-indigenous-crops/107316.

3. Over the last seven years, Sri Lanka has revived its old irrigation systems in three river basins of Mee Oya, Yan Oya and the Malwathu Oya.[117] This was achieved by setting up a Climate Resilient Integrated Water Project, funded by the Green Climate Fund.[118] Over the past two centuries, neglect and degradation of the system have disrupted water flows, leaving communities exposed to the worsening impacts of climate change.

Climate Financing

1. India plans to put in place a climate finance taxonomy, a set of guidelines to help investors and institutions direct funds towards investments related to climate change, over the coming 6 to 10 months.[119] Announced as part of the country's annual budget last year, the Indian government wants the taxonomy to help increase capital availability for climate adaptation and mitigation projects. It expanded its green finance framework through sovereign green bonds.[120] The Securities and Exchange Board of India also strengthened Environmental, Social and Governance regulations by enhancing reporting requirements under the Business Responsibility and Sustainability Reporting Core framework.[121]

2. Pakistan has formally requested US$1 billion (S$1.35 billion) from the IMF's Resilience and Sustainability Trust to address climate risks and to support adaptation projects and clean energy transition.[122]

Announced as part of the country's annual budget last year, the Indian government wants the taxonomy to help increase capital availability for climate adaptation and mitigation projects.

117 Azusa Kubota, "An Ancient Water System in Sri Lanka Offers a Blueprint for Climate Resilience", *PreventionWeb*, 14 October 2024, https://www.preventionweb.net/news/ancient-water-system-sri-lanka-offers-blueprint-climate-resilience.

118 United Nations Framework Convention on Climate Change (UNFCCC), "Green Climate Fund", *UNFCCC*, 4 September 2025, https://visionias.in/current-affairs/monthly-magazine/2025-09-04/environment/news-in-shorts.

119 Aathira Varier, "FinMin to Develop Climate Finance Taxonomy in 6-10 Months: DEA Secy", *Business Standard*, 3 September 2024, https://www.business-standard.com/finance/news/finmin-to-develop-climate-finance-taxonomy-in-6-10-months-says-ajay-seth-124090301266_1.html.

120 Business Desk, "Central Govt to Issue Rs 20,000 Crore 'Sovereign Green Bonds' in Four Tranches in FY25", *The Times of India*, 27 September 2024, https://timesofindia.indiatimes.com/business/india-business/central-govt-to-issue-rs-20000-crore-sovereign-green-bonds-in-four-tranches-in-fy25/articleshow/113746712.cms.

121 Saurabh Trivedi and Shantanu Srivastava, "Balancing BRSR Standards and Business Ease in India", Institute for Energy Economics and Financial Analysis (IEEFA), 18 July 2024, https://ieefa.org/resources/balancing-brsr-standards-and-business-ease-india.

122 Karin Strohecker, "Pakistan Requests $1 Billion in IMF Climate Funding", *Reuters*, 24 October 2024, https://www.reuters.com/world/asia-pacific/pakistan-formally-requests-imf-rst-money-targeting-1-bln-finance-minister-says-2024-10-24/.

A Fragmented Path Forward

The juxtaposition of escalating climate disasters and uneven international responses paints a troubling picture. The world's wealthiest nations are no longer mere spectators to the climate crisis, yet their actions – both individually and collectively – still lag behind the scale of the challenge.

These events expose the rising costs of climate inaction as developed countries face increasing climate risks.

The past year delivered severe disasters to wealthy nations. Wildfires in Los Angeles displaced thousands, while Spain and southern Europe faced heavy floods.[123] Hurricanes Helene and Milton struck the US East Coast. Global losses from natural disasters hit US$320 billion (S$432 billion) in 2024, with insured losses at US$140 billion (S$189 billion), among the highest on record.[124] These events expose the rising costs of climate inaction as developed countries face increasing climate risks.

The silver lining comes from the fact that while the US federal government falters on climate, other players are stepping up. Subnational actors like California, facing its worst climate-driven wildfires, are pursuing ambitious climate goals, including cap-and-trade and renewable energy mandates.[125] Corporate initiatives like Glasgow Financial Alliance for Net Zero continue to push private-sector clean energy commitments amid investor and consumer pressure.[126] However, current US political turmoil risks slowing corporate action and driving away climate investments.[127] This retreat, however, allows other nations to take the lead in climate diplomacy.[128]

123 Michael Kimmelman, "Los Angeles Fires Recovery Efforts in 2025", *The New York Times*, 1 February 2025, https://www.nytimes.com/2025/02/01/arts/design/los-angeles-fires-recovery.html.

124 Munich Re, "Natural Disaster Figures 2024", Munich Re, 4 January 2025, https://www.munichre.com/en/company/media-relations/media-information-and-corporate-news/media-information/2025/natural-disaster-figures-2024.html.

125 Dharna Noor, "How US States Are Leading the Climate Fight – Despite Trump's Rollbacks", *The Guardian*, 30 January 2025, https://www.theguardian.com/environment/2025/jan/30/climate-goals-states-trump.

126 Glasgow Financial Alliance for Net Zero (GFANZ), *GFANZ 2024 Progress Report*, (November 2024), https://assets.bbhub.io/company/sites/63/2024/11/GFANZ-Progress-Report-2024.pdf.

127 Eva Levesque, "Donald Trump's Climate Policy May Divert UAE Investments from the US", *AGBI*, 2 February 2025, https://www.agbi.com/analysis/renewable-energy/2025/02/donald-trump-climate-policy-may-divert-uae-investments-from-the-us/.

128 Kalina Gibson, "The Trump Administration's Retreat From Global Climate Leadership", Center for American Progress, 21 January 2025, https://www.americanprogress.org/article/the-trump-administrations-retreat-from-global-climate-leadership/.

Globally, the EU and China have positioned themselves as climate diplomacy leaders. The EU's Green Deal and China's clean energy investments – which contributed 40 per cent of its GDP growth in 2023 – demonstrate leadership even amid doubts about their ability to achieve global consensus.[129]

Globally, the EU and China have positioned themselves as climate diplomacy leaders.

With COP29 failing to meet the developing nations on fairer terms, crucial climate and economic talks at multilateral platforms like the G20 and the BRICS,[130] and new members may now gain traction outside post-World War II frameworks governing international monetary and financial systems.[131]

Though US elections are seen as setbacks, they are temporary; major stakeholders must face the climate crisis. Surprisingly, Wall Street has pushed back against Trump's anti-climate agenda – not for environmental reasons, but because banks hesitate to fund more fossil fuel extraction, while oil and gas companies resist investing further in sunset fuels.[132] Trump's tariff-driven economic disruptions, though harmful to growth, may ironically reduce greenhouse gas emissions by limiting consumption and supply chains.[133]

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129 Zia Weise, "EU's New Economic Vision Is Speaking to Green Deal Critics", *Politico*, 24 January 2025, https://www.politico.eu/article/eu-new-economic-vision-is-speaking-to-green-deal-critics-competitiveness-compass/; Giulia Interesse, "China's New Renewable Energy Plan: Key Insights for Businesses", *China Briefing*, 7 June 2024, https://www.china-briefing.com/news/chinas-new-renewable-energy-plan-key-insights-for-businesses/.

130 The BRICS is a group formed by 11 countries: Brazil, Russia, India, China, South Africa, Saudi Arabia, Egypt, the United Arab Emirates, Ethiopia, Indonesia and Iran. It serves as a political and diplomatic coordination forum for countries from the Global South and for coordination in the most diverse areas. See https://brics.br/en/about-the-brics.

131 Sunaina Kumar, "A Greater G20, and BRICS-by-BRICS, the Global South-Led Reform of International Governance", *The Interpreter* (Lowy Institute), 31 October 2024, https://www.lowyinstitute.org/the-interpreter/greater-g20-brics-brics-global-south-led-reform-international-governance; Stewart Patrick, "BRICS Expansion, the G20, and the Future of World Order", Carnegie Endowment for International Peace, 9 October 2024, https://carnegieendowment.org/research/2024/10/brics-summit-emerging-middle-powers-g7-g20?lang=en; Ben Norton, "BRICS Expands with New Partner Countries, Now It's Half of World Population, 41% of Global Economy", *Geopolitical Economy*, 25 December 2024, https://geopoliticaleconomy.com/2024/12/25/brics-expands-9-partner-countries-population-economy/.

132 David Fickling, "Trade War: The Climate Cost of Trump's Infinite Tariffs", *Bloomberg Opinion*, 24 April 2025,https://www.bloomberg.com/opinion/articles/2025-04-24/trade-war-the-climate-cost-of-trump-s-infinite-tariffs.

133 Jason Furman, "Trump Tariffs Are a Victory Against Climate Change", *Wall Street Journal*, 5 May 2025, https://www.wsj.com/opinion/trump-tariffs-are-a-green-victory-sustainability-climate-trade-rare-earths-4f88ffef.

Recommendations for South Asia

1. Hyperlocal Funding: Hyperlocal funding offers a way forward amid fragmented global leadership by channelling more resources to Urban Local Bodies and village administrations via national budgets, combined with fundraising and accountability measures, potentially linked to carbon markets with some sovereign guarantees backing them. They could follow financing structures akin in principle to long-gestation infrastructure financing: annuities, green municipal bonds, blended finance mechanisms and revenue-sharing models.

Additionally, climate resilience funds and pay-for-performance models, such as energy savings-based financing for efficiency projects, can offer viable funding strategies.

   Additionally, climate resilience funds and pay-for-performance models, such as energy savings-based financing for efficiency projects, can offer viable funding strategies. Public-private partnerships can also support local clean energy projects for long-term financial sustainability, while capacity-building grants and localised green development funds empower local governments to establish sustainable initiatives with transparency and accountability.

   This is relatively easy and quick, especially in countries like India, where local governments have experience managing public finances. For example, self-help groups in India and Bangladesh have successfully mobilised microfinance for rural development and women's empowerment.

   Microgrid financing through community-owned funds and revolving credit can aid electrification in remote areas. Building on this, decentralised renewable energy cooperatives could manage local solar or biogas projects. Participatory budgeting, where communities allocate sustainability funds, would boost transparency and efficiency.

2. Technology: Leveraging digital payment platforms and fintech can improve fund tracking and accountability and ensure effective and transparent use of public project funds.

   With giant leaps in artificial intelligence, prediction technology has vastly improved and can be deployed locally by integrating with weather stations for better disaster forecasting. Training large language models on local data enhances accuracy, while models like China's DeepSeek show falling deployment costs. However,

strict protocols are essential to mitigate security risks and ensure responsible use.

Well-designed policy around these solutions would also help in creating new jobs.

State of Energy and Climate in India

Kaushik Deb and Suyash Nandgaonkar

India is the world's fifth-largest economy and is on track to become the third-largest within this decade.

India is the world's fifth-largest economy and is on track to become the third-largest within this decade. Its per-capita income, however, still lags the emerging-market and developing country average by roughly 50 per cent.[1] The government has ambitious development plans, and has announced a target of *Viksit Bharat,* that is a developed economy status by 2047.[2] To achieve this status of a high-income country[3] by 2047, the per capita gross domestic product (GDP) growth rate would have to be at 6.4 per cent per annum[4] more than a third faster than the 4.7 per cent achieved from 2014 to 2023.[5]

This rapid economic growth will lead to an increase in energy demand. India's per capita primary energy consumption was just 35 per cent of the global average in 2023. An increase in electricity consumption to match the levels of upper-middle-income countries would require an increase in electricity generation capacity by 2.8 times just in 2023.[6] In its World Energy Outlook, the International Energy Agency (IEA) projects that India's energy demand, according to its stated policies, will be 1.74 times larger in 2050 compared to 2023, with a corresponding 61 per cent increase in greenhouse gas (GHG) emissions.[7]

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1 "World Economic Outlook Dataset (October 2024)", International Monetary Fund, 2024, https://www.imf.org/external/datamapper/datasets/WEO.

2 Nirmala Sitharaman, "Budget 2025-2026, Speech of the Minister of Finance", New Delhi: Ministry of Finance, Government of India, February 2025, https://www.indiabudget.gov.in/doc/Budget_Speech.pdf; *Press Trust of India*; "Union Finance Minister Nirmala Sitharaman Confident of India Inc Aligning to Country's Developmental Goals", *The Hindu*, 27 February 2024, https://www.thehindu.com/business/Industry/union-finance-minister-nirmala-sitharaman-addresses-viksit-bharat-2047-viksit-bharat-and-industry/article67891231.ece.

3 The World Bank defines a high-income country as one with a gross national income (GNI) per capita of $14,005 or more (as of 2025). See World Bank, World Bank Country and Lending Groups, "High-Income Economies", Washington DC: World Bank, 2025, https://datahelpdesk.worldbank.org/knowledgebase/articles/906519.

4 Arvind Virmani, *Viksit Bharat: Unshackling Job Creators and Empowering Growth Drivers*, NITI Working Paper, New Delhi: NITI Aayog, Government of India, 19 July 2024.

5 "Requirements at PPP (2017 dollars) and historical data in PPP 2021 USD", Organisation for Economic Co-operation and Development, https://www.oecd.org/en/data/indicators/purchasing-power-parities-ppp.html.

6 "Statistical Review of World Energy", Energy Institute, 2024, https://www.energyinst.org/statistical-review/home.; World Bank, "DataBank | The World Bank", 2024, https://databank.worldbank.org/home.aspx.

7 "World Energy Outlook 2024", International Energy Agency (IEA), 2024, https://www.iea.org/reports/world-energy-outlook-2024.

This creates a fundamental challenge: India's development needs will drive a rise in energy consumption and emissions, making sustainable growth a critical challenge. While on one hand, India needs to expand its energy consumption to sustain economic growth, on the other, doing so risks increasing global emissions significantly. With its large population and ambitious prosperity targets, India faces a unique dilemma in its development progression.

The Emissions Challenge

India is already a very climate-vulnerable country, having consistently recorded some of the hottest wet bulb temperatures in the world. Increasingly hotter summers every passing year have had health impacts, with 155,936 deaths attributable to high temperatures in the country in 2021.[8] A one-degree Celsius increase in temperature leads to a two per cent decline in labour productivity in Indian manufacturing,[9] leading to the necessity of climate control and adaptation, which further increases energy requirements. Overall, the temperature rise, under a carbon-intensive scenario, could lead to a decline of 2.8 per cent in household consumption by 2050, and a loss of 9.8 per cent of GDP per capita in the most severe hotspots.[10]

A one-degree Celsius increase in temperature leads to a two per cent decline in labour productivity in Indian manufacturing, leading to the necessity of climate control and adaptation, which further increases energy requirements.

At the same time, as the world's third-largest energy consumer and emitter of GHG, the country's energy and emissions trajectory will have global ramifications. Global fossil fuel carbon dioxide (CO_2) emissions showed no signs of abating, with 37.4 gigatonnes (GT) being emitted in 2024. Since industrialisation began in 1850, cumulative global CO_2 emissions have reached 2,607 GT CO_2. As a result, 94 per cent of the carbon budget needed to stay within the 1.5 degrees Celsius warming limit has already been used.[11] The European Union (EU) and the United

8 Global Burden of Disease Collaborative Network, "Global Burden of Disease Study 2021", Institute for Health Metrics and Evaluation (IHME), 2024, https://ourworldindata.org/grapher/number-of-deaths-gbd.

9 E. Somanathan, Rohini Somanathan, Anant Sudarshan and Meenu Tewari, "The Impact of Temperature on Productivity and Labor Supply: Evidence from Indian Manufacturing", *Journal of Political Economy*, No. 129, no. 6, June 2021, https://doi.org/10.1086/713733.

10 Muthukumara Mani, Sushenjit Bandyopadhyay, Shun Chonabayashi, Anil Markandya and Thomas Mosier, "South Asia's Hotspots", *World Bank Report*, 2018, https://documents.worldbank.org/en/publication/documents-reports/documentdetail/201031531468051189/south-asia-s-hotspots-the-impact-of-temperature-and-precipitation-changes-on-living-standards.

11 "Analysis: China's Emissions Have Now Caused More Global Warming than EU", *Carbon Brief*, 19 November 2024, https://www.carbonbrief.org/analysis-chinas-emissions-have-now-caused-more-global-warming-than-eu/.

States (US) bear the responsibility for 32 per cent of these emissions, while China accounts for another 11 per cent.[12] It is only now that the EU and the US have registered declines in fossil fuel emissions, suggesting they have likely reached their peak. Meanwhile, China is also likely to see only marginal increases in emissions over the next few years before peaking.

Most developed countries today have achieved prosperity before global environmental constraints became binding and tangible. India must chart a new path – one that flattens the environmental Kuznets curve while lifting millions out of poverty.

India's historical emissions are relatively low, but fossil fuel emissions are projected to rise by 4.6 per cent in 2024 compared to 2023.[13] This is critical as we are rapidly approaching the 1.5 degrees Celsius goal, with 2023 being the first global sustained year-long breach.[14] Most developed countries today have achieved prosperity before global environmental constraints became binding and tangible. India must chart a new path – one that flattens the environmental Kuznets curve while lifting millions out of poverty.[15]

The nation's commitment to achieving net-zero emissions by 2070 and reducing the emissions intensity of its GDP by 45 per cent compared to 2005 represents an attempt to resolve this dilemma.[16] The challenge lies in ensuring that the pursuit of economic growth and improved living standards does not compromise these environmental commitments. This necessitates a fundamental shift in how India approaches its energy needs, making strategic choices that prioritise cleaner sources while ensuring reliable and affordable access to energy. In attempting to achieve a balance, India has focused on all three key policy directions - access, environmental sustainability and independence.

12 Pierre Friedlingstein, Michael O'Sullivan, Matthew W. Jones, Robbie M. Andrew, Judith Hauck, Peter Landschützer, Corinne Le Quéré, et al., "Global Carbon Budget 2024", *Earth System Science Data Discussions*, 13 November 2024, 1–133, https://doi.org/10.5194/essd-2024-519.

13 Ibid.

14 Mark Poynting, "World's First Year-Long Breach of Key 1.5C Warming Limit", *BBC*, 8 February 2024, https://www.bbc.com/news/science-environment-68110310.

15 The environmental Kuznets curve suggests that as economies grow, environmental damage first increases, then decreases after reaching a certain level of development.

16 Government of India, *India's Updated First Nationally Determined Contribution Under Paris Agreement*, New Delhi: Government of India, 2022, https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf.

Climbing the Energy Ladder

The two drivers for increased energy demand are an increase in manufacturing and rapid urbanisation.

The relationship between economic growth and energy consumption is particularly crucial for India's development aspirations. The country's growth trajectory implies that by 2040, it will have the largest increase in energy demand globally, accounting for nearly a quarter of the global growth.[17] The two drivers for increased energy demand are an increase in manufacturing and rapid urbanisation.

A ramp-up in manufacturing is seen as central in ensuring sustained growth in employment opportunities for the large and growing trained young workforce. In the 2025-2026 financial year, the central government made an explicit push towards encouraging sectors like agriculture and small and medium manufacturing as the main drivers towards these development aims.[18] These moves are touted to create more skilled employment and higher productivity. There are alternate views and economists like Arvind Panagariya and Raghuram Rajan suggest a push towards more labour-intensive sectors like services and avoid a China-like manufacturing-led pathway.[19] Avoiding the heavy manufacturing pathway in this case will be an opportunity to reduce energy intensity in the future.

Urbanisation and improving standards of living will amplify this demand. India's urban population is projected to increase by 416 million by 2050,[20] adding an equivalent of two 'Singapores' every year. The urban consumer living in the capital consumes 3.5 times more electricity than the average Indian electricity consumer.[21] As urbanisation increases and incomes rise nationwide, demand – especially from energy-intensive

17 International Energy Agency (IEA), "India Energy Outlook 2021", *World Energy Outlook*, 2021, https://doi.org/10.1787/ec2fd78d-en.

18 Nirmala Sitharaman, "Budget 2025-2026, Speech of the Minister of Finance", New Delhi: Ministry of Finance, Government of India, February 2025, https://www.indiabudget.gov.in/doc/Budget_Speech.pdf.

19 Raghuram Govind Rajan and Rohit Lamba, *Breaking the Mould: Reimagining India's Economic Future*, (Gurugram, Haryana, India: Penguin Business, Penguin Random House India, 2023); and "Panagariya Pitches for More Labour-Intensive Industries", *The Hindu*, 17 May 2024, https://www.thehindu.com/business/panagariya-pitches-for-more-labour-intensive-industries/article68187621.ece.

20 United Nations, Department of Economic and Social Affairs, Population Division, "World Urbanization Prospects The 2018 Revision", (New York: United Nations, 2019), https://population.un.org/wup/assets/WUP2018-Report.pdf.

21 Radhika Khosla, "Plugging In: Energy Demand in Indian Residences", Keinman Center for Energy Policy, 22 March 2018, https://kleinmanenergy.upenn.edu/research/publications/plugging-in-energy-demand-in-indian-residences/.

appliances like cooling – is expected to rise significantly. By 2035, the demand from air conditioners alone is projected to exceed Mexico's total demand for electricity.[22]

According to our calculations, this access is estimated to have increased LPG consumption by 3-5 million tons per year during 2018-2022.

In rural India, even though almost all households have been officially electrified, the energy consumption per capita is still lower than the national average. A key priority area, especially to address indoor air pollution and its health impacts, has been provisioning clean cooking fuel. The country has seen 103 million official new liquefied petroleum gas (LPG) connections through a state-sponsored programme.[23] According to our calculations, this access is estimated to have increased LPG consumption by 3-5 million tons per year during 2018-2022. This amounts to more than an average month's consumption in 2023-2024, added every year. The increase can be attributed to the subsidies that not only promoted clean cooking since 2016 but also halted a decline in consumption that otherwise would have happened during COVID-19.[24]

The Decoupling Gap and Aims

Ambitious industrial policies such as 'Make in India' require affordable power to compete globally. 'Make in India' is a set of interconnected policies to promote manufacturing-led industrial development, with the broader aim of making India a manufacturing hub. The industrial sector already accounts for 41 per cent of the total energy consumption,[25] near parity with a heavily industrialised country like China, with 49 per cent.[26] This is despite the manufacturing sector (value added) accounting for just 14 per cent of GDP in 2023 compared to 26 per cent in China.[27] Interestingly, this policy dissolves the difference between

22 International Energy Agency (IEA), *World Energy Outlook 2024*, (2024), https://www.iea.org/reports/world-energy-outlook-2024.

23 Ministry of Petroleum and Natural Gas, Government of India, "Total Connections Released under Pradhan Mantri Ujjwala Yojana as on 23 Dec 2024", Pradhan Mantri Ujjwala Yojana 2.0, New Delhi: Ministry of Petroleum and Natural Gas, Government of India, 2024, https://pmuy.gov.in/.

24 Author's calculations. Estimates based on the predicted LPG consumption as a linear function of GDP and Population using data till 2016, the start of the programme. Data from the World Bank, "DataBank", 2024, https://databank.worldbank.org/home.aspx; and Petroleum Planning and Analysis Cell, Ministry of Petroleum and Natural Gas, Government of India, "Consumption Of Petroleum Products", February 2025, https://ppac.gov.in/consumption/products-wise.

25 International Energy Agency (IEA), "India - Efficiency and Demand", Paris: International Energy Agency, 2024, https://www.iea.org/countries/india/efficiency-demand.

26 International Energy Agency (IEA), "China - Efficiency and Demand", 2024, https://www.iea.org/countries/china/efficiency-demand.

27 "Panel Data: Manufacturing, Value Added (% of GDP) – China, India", *World Bank Open Data*, February 2025, https://data.worldbank.iorg.

India's manufacturing and services sectors. Twelve of the 27 sectors listed in 'Make in India' are classified as services in the national income accounts[28] and are less energy-intensive compared to the other heavy industries, while still increasing job creation and GDP growth. Thus, India's industrial policy may boost the economic growth while moderating the growth in energy consumption.

The path of reduction in energy intensity is reflected in the quantitative commitments in India's first nationally determined contributions (NDCs) to the United Nations (UN) Framework Convention on Climate Change in 2016: to reduce the carbon emissions intensity with respect to GDP by 33-35 per cent by 2030, relative to 2005 levels. The 2022 updated NDC increased this target to 45 per cent by 2030.[29] At the time of the first NDC announcement, the energy intensity was already 25 per cent lower relative to 2005, and so India met its target soon after in 2021.[30] Projections based on the Statistical Review of World Energy and the IMF's World Economic Outlook suggest that India's energy intensity could be nearly 70 per cent lower in 2030 than in 2005.[31] It does appear that by 2030, the country could have met an emissions intensity target even twice as much as it committed to initially. This reduction in energy intensity was largely an inevitable outcome due to the GDP growth being driven by the expansion of the services sector.

This reduction in energy intensity was largely an inevitable outcome due to the GDP growth being driven by the expansion of the services sector.

The current decoupling efforts, while noteworthy, fall short of what's needed to meet the additional Conference of the Parties (COP) 26 commitment laid out in the country's national statement, namely, net zero emissions by 2070. The IEA's 'Stated Policies Scenario' projects that India's energy-related CO_2 emissions are projected to peak sometime in the 2040s.[32] Assuming a peak for say 2045, CO_2 emissions will have to

28 Ministry of Commerce and Industry, Government of India, *10 Years of Make in India*, New Delhi: Ministry of Commerce and Industry, Government of India, 25 September 2024, http://pib.gov.in/PressNoteDetails.aspx?NoteId=153203.

29 Government of India, "India's Updated First Nationally Determined Contribution Under Paris Agreement", New Delhi: Government of India, 2022, https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf.

30 Ministry of Environment, Forest and Climate Change, Government of India, "India Achieves Two Targets of Nationally Determined Contribution Well Ahead of the Time", Press Release, New Delhi: Ministry of Environment, Forest and Climate Change, 18 December 2023, https://pib.gov.in/pib.gov.in/Pressreleaseshare.aspx?PRID=1987752.

31 Author's calculations. "Statistical Review of World Energy", *Energy Institute*, 2024. https://www.energyinst.org/statistical-review/home; International Monetary Fund (IMF), *World Economic Outlook Dataset (October 2024)*, 2024. https://www.imf.org/external/datamapper/datasets/WEO.

32 International Energy Agency (IEA), *India Energy Outlook 2021*, Paris: International Energy Agency, 2021, https://doi.org/10.1787/ec2fd78d-en.

have a net decline of at least 150 million tonnes per annum to get to net-zero in the 25 years until 2070 (not accounting for newly created carbon sinks).[33] This would mark a significant departure from the current pathway, where GHG emissions from fuel combustion alone have grown by an average of 4 per cent per annum since 2010. The stated policies do not cohere together for a complete decarbonisation plan.

India has successfully reduced its energy intensity but remains far from a full decarbonisation pathway. Without stronger policies, emissions will continue to rise well into the 2040s, delaying progress toward net-zero goals. Addressing this gap requires a major shift in India's energy sources and an accelerated clean energy transition.

Decarbonising the Energy Mix

Renewable energy growth, while significant, has not kept pace with increasing energy demand.

India's energy transition plans face multiple challenges. The power sector shows limited signs of rapid transformation. Renewable energy growth, while significant, has not kept pace with increasing energy demand. The result is continued reliance on fossil fuels, particularly coal. India's heavy dependence on coal represents one of the most significant challenges in its energy transition. Coal accounted for 74.6 per cent of India's electricity generation in 2023-24, a proportion that has fluctuated only by a few percentage points over the last decade despite renewable energy growth.[34] This persistence of coal dominance can be attributed to several interconnected factors that make the transition particularly challenging. First, coal has historically been considered critical to India's energy needs for its availability and affordability. India possesses substantial domestic coal reserves, around 378 billion tonnes in 2023,[35] making it the world's fifth-largest reserve holder.[36] As a result, domestic coal, along with domestic lignite, has been able to account for all of

33 STEPS projects energy-related CO2 emissions at 3769 Mt CO2 in 2040. Assuming steady till 2045 and then a net-decline to zero by 2070 would require an average of 150Mt reduction per year over 25 years, or 125 Mt per year if decline starts from 2040 immediately.

34 NITI Aayog, Government of India, "Power Generation Mix", India Climate and Energy Dashboard, New Delhi: NITI Aayog, Government of India, 2024, https://iced.niti.gov.in/energy/electricity/generation/power-generation.

35 Ministry of Coal, Government of India, "Coal Reserves", New Delhi: Ministry of Coal, Government of India, 2023, https://coal.gov.in/en/major-statistics/coal-reserves.

36 U.S. Energy Information Administration (EIA), "How Much Coal Is Left", Washington DC: U.S. Energy Information Administration, October 2023, https://www.eia.gov/energyexplained/coal/how-much-coal-is-left.php.

India's coal-based electricity generation,[37] even as the majority of the higher-grade industrial coal is imported. This has kept prices reliably low for power generation.

The reliability factor also plays a crucial role as coal plants provide baseload power. This predictability is particularly valuable given India's growing power demands and the need for a 24/7 electricity supply to support industrial growth. With rising electricity consumption, a flexible and expansive grid is necessary. The intermittent nature of renewables makes it challenging to scale up their share in electricity generation. Thermal power plants have a higher capacity utilisation, and given the current limitations of storage technology, coal's reliability is a necessary advantage.

Coal, while imposing heavy environmental costs, has locked in social and political benefits in India. Royalties from mining and selling account for a significant portion of non-tax revenue in coal-producing states. In certain coal-dependent states, sometimes impoverished, royalties can account for up to 10 to 25 per cent of non-tax revenues.[38] The established mining infrastructure is complemented by India's extensive state-run railway network, where the network is being expanded specifically for coal.[39] Coal freight revenues account for 49 per cent of total freight income for the railways, a critical part of maintaining its financial stability.[40]

Royalties from mining and selling account for a significant portion of non-tax revenue in coal-producing states.

Despite coal's entrenchment, India's renewable energy sector has made remarkable progress over the past decade. In 2015, at the UN Sustainable Development Summit, India pledged to increase its renewable energy installed capacity to 175 gigawatts (GW) by 2022.[41] The 2016 NDC had

37 NITI Aayog, Government of India, "Coal Consumption in India", India Climate and Energy Dashboard, New Delhi: NITI Aayog, Government of India, 2024, https://iced.niti.gov.in/energy/fuel-sources/coal/consumption.

38 Souvik Bhattacharjya, Ruchi Gupta, G. Mini, Saswata Chaudhary, Mani Juneja and Kartikeya Sharma, "Assessing Vulnerability from Coal Dependence and Need for a Just Transition", The Energy and Resources Institute (TERI), New Delhi: The Energy and Resources Institute, 2021, https://www.terin.org/sites/default/files/2021-06/Coal-Dependence-Need-Just-Transition_WP1.pdf.

39 Shriparna Saha, "India Fast-Tracks 38 Rail Projects to Boost Domestic Coal Transport", S&P Global *Commodity Insights*, 30 August 2024, https://www.spglobal.com/commodity-insights/en/news-research/latest-news/coal/083024-india-fast-tracks-38-rail-projects-to-boost-domestic-coal-transport; and

40 Ministry of Coal, Government of India, "Economic Significance of the Coal Sector Extends Beyond Energy Production", New Delhi: Ministry of Coal, Government of India, 18 February 2024, https://pib.gov.in/pib.gov.in/Pressreleaseshare.aspx?PRID=2009196.

41 "Full Text of Narendra Modi's Speech at UNA Summit", *Livemint*, 26 September 2015, https://www.livemint.com/Politics/XQNnmExc5ruApWC3oCDrXK/Full-text-of-Narendra-Modis-speech-at-UNAA-summit.html.

committed to increasing the share of non-fossil fuels from the then 30 per cent to 40 per cent by 2030, and the 2022 NDC raised that to 50 per cent by 2030. At COP26 in Glasgow in 2021, the country's national statement laid out the *Panchamrit* plan, which added India's net zero emissions target by 2070, increased the renewable electricity capacity goal to 500 GW by 2030.[42]

In other words, the country has added nearly 15 GW of clean energy capacity per year since 2015.

At the time of the first announcement in 2015, India had 36 GW of renewable energy and another 42 GW of large hydropower. Since then, considerable progress has been achieved, and the country has an installed capacity of all renewables of over 200 GW as of October 2024.[43] Solar power has emerged as the flagship contributor to renewable energy, with 92 GW installed capacity supported by several state programmes for PV manufacturing and decentralised small-scale capacity. Wind and large hydro contributed 47 GW and 46 GW, respectively. Including nuclear, the total carbon-free generation capacity is over 210 GW. In other words, the country has added nearly 15 GW of clean energy capacity per year since 2015. In addition, the share of non-fossil capacity in total installed capacity in the country already exceeded the 2016 NDC target by October 2021 and is nearly 47 per cent today.[44]

The updated 500 GW target would require India to add nearly 50 GW annually between now and December 2030. To meet this challenge, the government has decided to invite bids for 50 GW of renewable energy capacity annually between the financial years 2023-24 and 2027-28.[45] In fact, at COP29, India stated that the country was on track to meet the 500 GW capacity goal by 2030. Despite this progress on the capacity front, fossil fuels still account for nearly 75 per cent of the total electricity generation, albeit down from 80 per cent in 2015.[46]

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42 Narendra Modi, "National Statement by PM at COP26 Summit in Glasgow", Presented at the COP26, November 2021, https://www.pmindia.gov.in/en/news_updates/national-statement-by-pm-at-cop26-summit-in-glasgow/.

43 NITI Aayog, Government of India, *Installed Capacity Mix*, NITI Working Paper, (New Delhi: NITI Aayog, Government of India, 2024), https://iced.niti.gov.in/energy/electricity/generation/capacity.

44 Ibid.

45 Ministry of New and Renewable Energy, Government of India, "Government Declares Plan to Add 50 GW of Renewable Energy Capacity Annually for next 5 Years to Achieve the Target of 500 GW by 2030", Press Release, New Delhi: Ministry of New and Renewable Energy, Government of India, 5 April 2023, https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=1913789.

46 NITI Aayog, Government of India, "Power Generation Mix", *India Climate and Energy Dashboard*, New Delhi: NITI Aayog, Government of India, 2024, https://iced.niti.gov.in/energy/electricity/generation/power-generation.

Like the emissions intensity NDC target, this too is in line with the progress already being made but does not account for the real impact of actual generation that is still dominated by fossil fuels. Thus, expanding clean energy capacity is necessary, but ensuring actual generation from renewables remains a challenge.

Energy Independence

India's Prime Minister Narendra Modi, during his speech on the country's Independence Day in 2021, set a target of energy independence by 2047 for the country.[47] The various strategies announced to meet this target are climate focused. These include increasing the share of gas in the energy mix to replace coal and oil, reducing diesel consumption by the railways with greater electrification, and launching a National Green Hydrogen Mission. The Indian Railways too has set a target to achieve net-zero carbon emissions by 2030. With 97 per cent of broad-gauge tracks that account for nearly all the total railway tracks already electrified, it would appear that, yet another scheduled climate goal is likely to be met well ahead of the target date.[48]

On the other two fronts, clean hydrogen and natural gas, progress has been patchy. India's National Green Hydrogen Mission aims to make the country a global hub for green hydrogen production, reducing reliance on fossil fuels and cutting carbon emissions. The mission targets five million metric tons of annual green hydrogen production by 2030.[49] While there has been a significant increase in budgetary allocations to subsidise the manufacturing of electrolysers for the programme, and a few pilot projects have been launched,[50] it is not clear where the demand for hydrogen will come from in the absence of mandated

The mission targets five million metric tons of annual green hydrogen production by 2030.

47 Jasleen Bhatti, "Making India Energy-Independent by 2047: A Look at PM Modi's Blueprint", *Down To Earth*, 18 August 2021, https://www.downtoearth.org.in/energy-efficiency/making-india-energy-independent-by-2047-a-look-at-pm-modi-s-blueprint-78528.

48 "Railways Achieve 97% Electrification, Targets 100% Green Rail Network: Govt", *Business Standard*, 27 November 2024, https://www.business-standard.com/india-news/railways-achieve-97-electrification-targets-100-green-rail-network-govt-124112701226_1.html.

49 Ministry of New and Renewable Energy, Government of India, *NATIONAL GREEN HYDROGEN MISSION (NGHM)*, Press Release, (24 July 2024), https://pib.gov.in/pib.gov.in/Pressreleaseshare.aspx?PRID=2039091.

50 Ministry of New and Renewable Energy, Government of India, "Launch of Pilot Projects in Steel Sector under the National Green Hydrogen Mission", Press Release, New Delhi: Ministry of New and Renewable Energy, Government of India, 18 October 2024, https://pib.gov.in/pib.gov.in/Pressreleaseshare.aspx?PRID=2065985.

offtakes, for example, by the refining industry. In particular, a focused effort to identify which hard-to-abate sectors would be the most appropriate consumer of this expensive fuel needs to be central to the country's hydrogen strategy.

This goal is being operationalised by expanding gas-based infrastructure, including city gas distribution, liquefied natural gas terminals and pipeline networks.

India plans to raise natural gas's share in its energy mix to 15 per cent by 2030 [51] as part of its clean energy strategy.[52] This goal is being operationalised by expanding gas-based infrastructure, including city gas distribution, liquefied natural gas terminals and pipeline networks. However, despite this increase in infrastructure, the share of natural gas in India's energy mix has remained stubbornly around 6-7.5 per cent since 2014.[53]

Separately, a number of initiatives to increase the domestic production of coal, oil and gas have also been introduced to reduce India's import dependence. At India Energy Week 2025, the government emphasised reforms in the exploration and production sector for hydrocarbons, especially a new regulatory framework and a much larger-scale Open Acreage Licensing Policy for private actors to explore new fields. This is in addition to the regular push towards incentivising renewables manufacturing and battery storage systems. Nevertheless, the share of imported crude oil remains well over 85 per cent, while the share of imported natural gas has increased by 70 per cent[54] since 2012. Achieving energy independence also requires securing critical minerals, particularly in light of China's dominance in this sector.

India aims for energy independence by 2047 by focusing on renewables, hydrogen and natural gas, but progress has been uneven. High import dependence on fossil fuels and critical minerals poses long-term risks.

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51 Ministry of Petroleum and Natural Gas, Government of India, "The Government Has Set a Target to Raise the Share of Natural Gas in Energy Mix to 15% in 2030 from about 6.3% Now", Press Release, New Delhi: Ministry of Petroleum and Natural Gas, Government of India, July 2022, https://pib.gov.in/Pressreleaseshare.aspx?PRID=1844630.

52 Ministry of Petroleum and Natural Gas, Government of India, "Draft LNG Policy -Public Consultation Document", New Delhi: Ministry of Petroleum and Natural Gas, Government of India, 17 February 2021, https://mopng.gov.in/files/Whatsnew/Draft-LNG17021_0001-(1).pdf.

53 NITI Aayog, Government of India, "India's Energy Mix & Power Sector Overview", India Climate and Energy Dashboard, New Delhi: NITI Aayog, Government of India, 2025, https://iced.niti.gov.in/energy.

54 Petroleum Planning and Analysis Cell (PPAC), Ministry of Petroleum and Natural Gas, Government of India, "Natural Gas Consumption", New Delhi: Ministry of Petroleum and Natural Gas, Government of India, February 2025, https://ppac.gov.in/natural-gas/consumption.

Conclusion

India stands at a critical juncture in NDC commitments, with the next milestone rapidly approaching. Under the Paris Agreement, all signatory nations are required to submit their updated NDCs ahead of COP30, incorporating more ambitious targets for the 2025-2035 period. Thus far, India has maintained a strategic silence, refraining from disclosing specific details regarding the manner in which it intends to enhance its climate commitments. While the country has justifiably met its existing NDC targets, significantly greater ambition will be required to reinforce its leadership among developing nations in climate action and sustainability, while also contributing to global efforts to remain within the planetary carbon budget. It is likely that India's revised NDCs will include higher targets for emissions intensity reduction and enhanced commitments to non-fossil energy expansion, in alignment with its goal of achieving 500 GW of installed non-fossil fuel capacity by 2030.

Thus far, India has maintained a strategic silence, refraining from disclosing specific details regarding the manner in which it intends to enhance its climate commitments.

India has, thus far, navigated a delicate balance between ambition and pragmatism, ensuring that its climate commitments align with its broader economic and developmental objectives of universal access to modern energy forms and security of supply by increasing domestic supply alternatives, especially alternative fuels. The country's energy strategy must align with its climate commitments especially as it prepares for its next round of global climate negotiations. With increasing prosperity and ambitious plans for increasing domestic manufacturing capacity, treading this knife-edge calls for an integrated strategic approach to managing the country's energy transition.

Geoeconomics and Manufacturing Supply Chains: The Case of Pharmaceuticals

Gopal Nadadur

Many governments are also looking to seize the opportunity to attract manufacturing value chains to promote industrialisation and job creation.

Manufacturing supply chains are among the main battlegrounds of geoeconomics. The competition between the United States (US) and China and the pandemic shock are motivating policymakers and business leaders to at least consider diversifying supply chains and to shift their strategies from "just in time" to "just in case". Many governments are also looking to seize the opportunity to attract manufacturing value chains to promote industrialisation and job creation.

Pharmaceuticals are a particularly interesting case in point, given: 1) their comprising critical and emerging technologies of vital importance to health security and national security; 2) the push by governments and companies in countries such as India to attract supply chains that are diversifying beyond China; and yet 3) the continued and high dependence on China for vital manufacturing inputs.

India is in many ways in a prime position to capitalise on favourable geoeconomics, leveraging its impressive pharmaceutical manufacturing base. Additionally, the emergence of India as a real alternative to China in this industry would be beneficial to the world by increasing supply security.

India's Union and state governments and the private sector are taking steps to this end. However, reconfiguring supply chains is not quick or easy and cannot be taken for granted. India needs to do more to make the most of the opportunity.

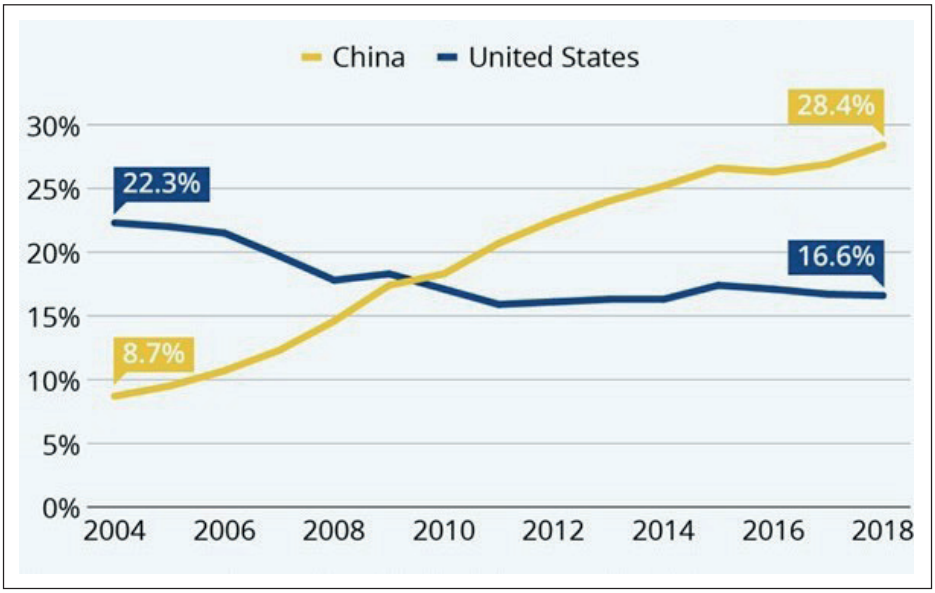
Similarly, Bangladesh, Pakistan and Sri Lanka too could benefit from the geoeconomics, albeit at a smaller scale, given their own footprints in the pharmaceutical industry.

Background: Geoeconomics and Manufacturing Supply Chains

For many decades, global companies aggressively pursued increased efficiency and cost-effectiveness through "just in time" operations,

involving the leanest and cost-effective processes.[1] This trend accelerated in the 2000s, following China's accession to the World Trade Organisation in 2001 (see Figure 1). Companies from the US and the European Union (EU) shifted large parts of their supply chains to China in pursuit of lower costs.

Figure 1: Growth in China's Share of the World's Manufacturing, 2004-2018 (US$)

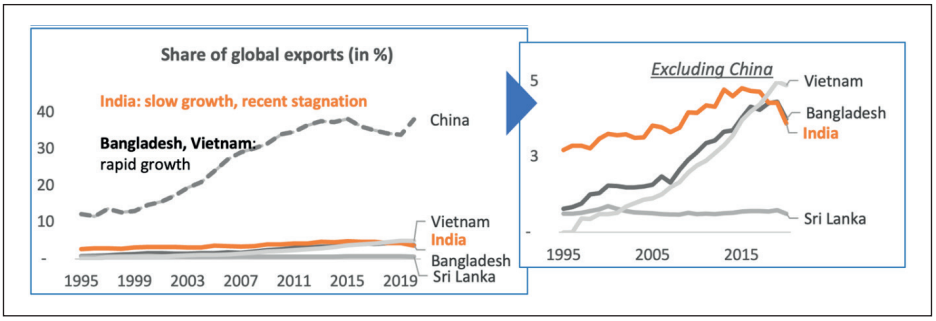


Source: Felix Richter, "China's Rise to Manufacturing Dominance", Statista, 18 February 2020,https://www.statista.com/chart/20859/chinese-and-us-share-of-global-manufacturing-output/

The 2010s saw the start of some supply chain shifts away from China, a trend that accelerated over the decade. This was especially the case for labour-intensive industries, for example, garment, footwear and furniture manufacturing. Companies in these industries – which are highly motivated by labour arbitrage – explored new locations such as Vietnam and Bangladesh as labour costs in China increased. Figure 2 shows this trend from the standpoint of exports of ready-made garments to the US.

1 Robert Sheldon, "Just-in-Time Manufacturing", *TechTarget*, 17 October 2022, https://www.techtarget.com/whatis/definition/just-in-time-manufacturing-JIT-manufacturing.

Figure 2: China's Growing then Falling Share of Exports to the US



Source: The US International Trade Commission (USITC). https://dataweb.usitc.gov/

Since the late 2010s, two global shocks have dramatically influenced companies' prioritisation of supply chain diversification from "just in time" to "just in case" operations, with the latter involving more redundancy, even at higher costs.

The Trump administration also banned China's Huawei from sourcing inputs from US companies.

The first shock – or series of shocks – was the sharp rise in US-China tensions during Donald Trump's first term as president of the US. Trump initiated a trade war against China with a series of announcements throughout 2018 and 2019 of steadily widening scope: starting with tariffs on all imports (not just China), then focusing on China and on an increasing list of products. The Trump administration also banned China's Huawei from sourcing inputs from US companies.[2]

The succeeding Joe Biden administration, in many ways, continued the ante. The administration retained most of the tariffs announced in 2018 and 2019. It instituted greater screenings, including through the Committee on Foreign Investment in the US (CFIUS), of investments from China. The Biden administration also supported measures such as the US Blocking Investments in Our States by China's Untrustworthy, Repressive Efforts (BIOSECURE) Act, which is described in greater detail in the following section.

The geopolitical competition between Washington and Beijing is likely to continue and grow, with China being one of the few topics retaining bipartisan support in US politics. Trump's second presidency has brought

2 Heather Timmons, "Timeline: Key dates in the U.S.-China trade war", *Reuters*, 17 January 2020, https://www.reuters.com/article/business/timeline-key-dates-in-the-us-china-trade-war-idUSKBN1ZE1AA/.

heightened impetus to the tariff war. The Trump administration imposed sectoral tariffs on imported automobiles, auto parts, steel and aluminium and began investigations into pharmaceuticals and pharma ingredients, processed critical minerals, semiconductors and chip-making equipment, and commercial aircraft and jet engines, all under Section 232 of the Trade Expansion Act.[3] The administration also imposed a 10 per cent baseline tariff on all countries as well as country-specific "reciprocal tariffs".[4]

The tensions between the US and China continued through these global measures. Washington and Beijing escalated tariffs from 1 February 2025 (the US imposed 10 per cent tariffs on Chinese goods imports and ended their de minimis exemption) to 11 April 2025 (US and Chinese tariffs reached 145 per cent and 125 per cent, respectively).[5] Along the way, China introduced new curbs on exports of certain rare earths. Both sides announced a de-escalation on 10 June 2025. However, the dynamic of long-term competition remains.

The second global shock to motivate supply chain diversification was the COVID-19 pandemic of the early 2020s. In a matter of weeks and months, the pandemic drove home in no uncertain terms the perils of over-reliance on single sources of supply, particularly when that single source is involved in geopolitical and geo-economic contests. The world was forced to confront fears – actual or potential – of shortfalls of healthcare commodities, ranging from vaccines, drugs, medical devices such as pulse oximeters and oxygen supply and even simple face masks.[6]

The second global shock to motivate supply chain diversification was the COVID-19 pandemic of the early 2020s.

These two shocks have been followed more recently by the conflicts in Ukraine and the Middle East, the latter continuing to expand in geographic scope. Both these conflicts have caused disruptions and risks to food, fuel and fertilisers, and impacted the costs and times of shipping, with

3 Patrick Wingrove and David Lawder, "US steps up probes into pharmaceutical, chip imports, setting stage for tariffs", *Reuters*, 15 April 2025, https://www.reuters.com/markets/us-initiates-section-232-investigations-into-pharmaceutical-semiconductor-2025-04-14/.

4 David Lawder and Trevor Hunnicutt, "US starts collecting Trump's 10 per cent tariff, smashing global trade norms", *Reuters*, 6 April 2025, https://www.reuters.com/markets/us-starts-collecting-trumps-new-10-tariff-smashing-global-trade-norms-2025-04-05/.

5 Chad de Guzman, "Latest U.S.-China talks yield new trade truce: Timeline of the tariff war", *Time*, 12 June 2025, https://time.com/7292207/us-china-trade-war-trump-tariffs-timeline/.

6 Mekonen ZT, Fenta TG, Nadeem SP, Cho DJ, "Global Health Commodities Supply Chain in the Era of COVID-19 Pandemic: Challenges, Impacts and Prospects: A Systematic Review", *J Multidiscip Healthc.*, No. 17, 2024, 1523-1539, https://pubmed.ncbi.nlm.nih.gov/38623396/.

Supply chains and their diversification are, therefore, among the top priorities in many governments and corporate boardrooms across the world.

maritime traffic in the Red Sea and the Suez Canal dropping up to 80 per cent at times.[7] In a nutshell, since the 2010s, the world has been dealing with increasing levels of uncertainties associated with a variety of supply chains: life sciences (pharmaceuticals and medical devices), food, fuel, electronics and semiconductors, critical minerals and rare earths and more. Supply chains and their diversification are, therefore, among the top priorities in many governments and corporate boardrooms across the world.

Many governments also sense a once-in-a-lifetime opportunity to attract manufacturing and thereby promote industrialisation and job creation at home. Governments across the world are leaning into industrial policy. This includes advanced economies such as the US, where industrial policy was almost a taboo in some economic circles for decades.[8] In 2022, the US announced measures such as the Inflation Reduction Act[9] and the CHIPS and Science Act,[10] designed to re-shore or friend-shore manufacturing. The Trump administration's trade policy is also aimed at re-shoring supply chains.

The South Asian governments are not laggards in industrial and trade policy, despite having smaller financial resources to deploy. India's Production Linked Incentive (PLI) and other measures aimed at specific manufacturing value chains are a case in point. The PLI was among the factors that convinced Apple to invest in smartphone manufacturing in India starting in the early 2020s. Apple's production in India has since grown to over US$10 billion (S$13.5 billion) in 2024, with 70 per cent of these iPhones exported.[11] Starting in 2021, India also accelerated its pursuit of trade agreements, concluding deals with the United Arab

7 Rajeev Master, "Red Sea Crisis: How Rerouting is Impacting Shipping Costs", *GEP*, 11 March 2024, https://www.gep.com/blog/mind/red-sea-crisis-how-rerouting-is-impacting-shipping-costs.

8 Dani Rodrik, "The Return of Industrial Policy", *Project Syndicate*, 20 January 2013, https://www.business-standard.com/article/opinion/dani-rodrik-the-return-of-industrial-policy-110420000055_1.html.

9 United States (US) Department of Energy, *Inflation Reduction Act of 2022*, (Washington DC: US Department of Energy), https://www.energy.gov/lpo/inflation-reduction-act-2022#

10 United States (US) Congress, *Summary of H.R.4346 – 117th Congress (2021-2022): CHIPS and Science Act*, (Washington DC: US Congress), https://www.congress.gov/bill/117th-congress/house-bill/4346.

11 ET Online, "Apple's iPhone production touches $10 bn mark in India. Courtesy, PLI", *Economic Times*, 25 November 2024, https://economictimes.indiatimes.com/industry/cons-products/electronics/apples-iphone-production-touches-10-bn-production-mark-in-india-courtesy-pli/articleshow/115654735.cms?from=mdr.

Emirates, Australia, the European Free Trade Association and the United Kingdom, and accelerating talks with the US and the EU, among others.[12]

Bangladesh's industrial policy is famed for growing the country's ready-made garments industry's share in world exports from around 2.5 per cent in the early 2000s to around eight per cent in 2020.[13] The government was more recently looking at ways to diversify and digitise the economy to grow the footprint of other sectors.

Bangladesh's industrial policy is famed for growing the country's ready-made garments industry's share in world exports from around 2.5 per cent in the early 2000s to around eight per cent in 2020.

Why Pharmaceuticals are an Interesting Case Study

Pharmaceuticals are a particularly interesting case in point when it comes to manufacturing supply chains amid current geopolitics, for three reasons. First, pharmaceuticals comprise critical and emerging technologies of vital importance to health security and national security. Second, governments and companies in countries such as India are pushing to attract pharmaceutical supply chains that are diversifying beyond China. Third, and notably, India and like-minded countries remain highly and even increasingly dependent on China for vital manufacturing inputs.

Critical and Emerging Technologies of Importance to Health Security and National Security

Synthetic biology, such as messenger Ribonucleic Acid-based technologies, has been identified as one of the foundational technologies of the 21st century and of great consequence for geopolitical competition.[14]

The protection of genomic data, which is essential for research and development (R&D), is also of increasing importance to policymakers. This is the stated motivation of the US' BIOSECURE Act, for instance, which was making its way through the US Congress in 2024 and may

12 PTI, "All you need to know about India's free trade agreements", *Deccan Herald*, 6 May 2025, https://www.deccanherald.com/india/explained-all-you-need-to-know-about-indias-free-trade-agreements-3527241.

13 Desk Report, "Bangladesh's global market share in apparel exports increases to 7.9%", *TextileToday.*

14 Graham Allison, Kevin Klyman, Karina Barbesino, Hugo Yen, *The Great Tech Rivalry: China vs the U.S.*, Avoiding the Great War Project, (Cambridge: Harvard Kennedy School, Belfer Center for Science and International Affairs, December 2021), www.belfercenter.org/sites/default/files/2024-09/GreatTechRivalry_ChinavsUS_211207.pdf.

The BIOSECURE Act looks to forbid any entities receiving funding from the US federal government from having biotechnology dealings with a company associated with a foreign adversary.

be reintroduced in 2025.[15] The BIOSECURE Act looks to forbid any entities receiving funding from the US federal government from having biotechnology dealings with a company associated with a foreign adversary. If passed into law, the BIOSECURE Act would force American pharmaceutical companies and research laboratories to drastically alter their supply chains, which are highly dependent on China for inputs and contract research, development and manufacturing.

The National Defence Authorisation Act (NDAA) for Fiscal Year 2025, currently being considered by the US Senate, offers additional evidence of national security concerns over biotech supply chains.[16] The NDAA's provisions include, among other priorities, securing biotech supply chains against China's espionage and economic coercion.

Additionally, pharmaceuticals are crucial for the well-being and productivity of societies. Yet even leading economies such as the US and Japan are contending with supply shortfalls. The US was dealing with 277 active drug shortages as of September 2024, down from a high of 323 shortages earlier in the year.[17] In October 2024, around 20 per cent of drug shipments were limited or halted due to shortfalls.[18]

Governments and Companies Attempting to Attract Diversifying Supply Chains

India's pharmaceutical industry is already a world leader in many respects:[19] It exports to over 200 countries; it is largest supplier of low-cost generics and vaccines, manufacturing over 20 per cent of generic medicines and 60 per cent of the world's vaccines; and it is home to

15 United States (US) Congress, *H.R.833 - BIOSECURE Act. 118th U.S. Congress, 2023-2024*, (Washington DC: US Congress, 2024), https://www.congress.gov/bill/118th-congress/house-bill/8333.

16 United States (US) Congress, *S.4638 - National Defense Authorization Act for Fiscal Year 2025*, (Washington DC: US Congress, 2024), https://www.congress.gov/bill/118th-congress/senate-bill/4638.

17 Erin R Fox, Michael Ganio, "National Drug Shortages: January 2001 – September 2024", American Society of Health-System Pharmacists, 2024, https://www.ashp.org/drug-shortages/shortage-resources/drug-shortages-statistics?loginreturnUrl=SSOCheckOnly.

18 NHK World Japan, "Survey: Shipments of about 20% of prescription drugs limited or halted in Japan", *NHK World*, 20 November 2024, https://www3.nhk.or.jp/nhkworld/en/news/20241120_27/.

19 Ministry of Health and Family Welfare, "India's Pharma Exports grow over 125% in last 9 years", PIB Ahmedabad, 13 June 2023, https://www.pib.gov.in/PressReleasePage.aspx?PRID=1932026; and Rimjhim Singh, "Indian pharma sites outpace global standards in USFDA inspections for 2023", *Business Standard*, 27 June 2024, https://www.business-standard.com/india-news/indian-pharma-sites-outpace-global-standards-in-usfda-inspections-for-2023-124062700386_1.html#goog_rewarded.

around 650 Federal Drug Administration (FDA)-approved plants, the highest in any country outside the US.

Clearly, India holds a different position in pharmaceuticals compared to electronics, where smartphones and many other products are being manufactured in India for the first time in recent years.

India's ambitions for its bioeconomy are therefore substantial. The industry has grown from US$10 billion (S$13.5 billion) in 2014 to US$130 billion (S$175.5 billion) in 2024, with the government targeting US$300 billion (S$405 billion) by 2030.[20] India's Union and state governments are moving aggressively to achieve these lofty goals. The Union government's measures include the Bioeconomy Policy, the PLI and the Scheme for Promotion of Bulk Drug Parks, among others.

The Union government's measures include the Bioeconomy Policy, the PLI and the Scheme for Promotion of Bulk Drug Parks, among others.

In addition, many state governments are competing with their peers to lure investments and economic development. To do so, they are offering additional subsidies and facilitation. For instance, the government in Telangana, which is home to Hyderabad, one of India's leading life sciences hubs, offers incentives ranging from significant reimbursements of State Goods and Service Tax and covering skilling costs to preferential status in state procurements. For investments greater than US$35 million (S$47.25 million), the state is willing to customise policies and incentives.[21]

India is also seeking to work on pharmaceutical supply chains with like-minded partners. Examples of such international cooperation span bilateral efforts, such as the India-US Transforming the Relationship Utilising Strategic Technology initiative,[22] and minilateral ones, such as the Quadrilateral Security Dialogue (Quad)[23] – comprising Australia,

20 Saurav Anand, "India's bioeconomy to hit $300 bn by 2030 under new BioE3 policy", *ETEnergyWorld*, 27 August 2024, https://energy.economictimes.indiatimes.com/news/renewable/indias-bioeconomy-to-hit-300-bn-by-2030-under-new-bioe3-policy/112821554.

21 Telangana Life Sciences, Government of Telangana, "Incentives", (Hyderabad: Government of Telangana), https://lifesciences.telangana.gov.in/invest-or-expand/incentives/.

22 Rudra Chaudhari, "What is the India-United States TRUST initiative?", Carnegia India, 22 April 2025, https://carnegieendowment.org/posts/2025/04/what-is-the-india-united-states-trust-initiative?lang=en.

23 The White House, "The Wilmington Declaration Joint Statement from the Leaders of Australia, India, Japan and the United States", 21 September 2024, https://www.whitehouse.gov/briefing-room/statements-releases/2024/09/21/the-wilmington-declaration-joint-statement-from-the-leaders-of-australia-india-japan-and-the-united-states/.

India, Japan and the US – and the Biopharma Alliance,[24] which includes the EU, India, Japan, South Korea and the US.

Alongside these governmental efforts, the Indian industry too is pushing to grow its own footprint in global pharmaceutical value chains.

Alongside these governmental efforts, the Indian industry too is pushing to grow its own footprint in global pharmaceutical value chains. Leading Indian pharmaceutical companies are now hungry for more growth in the world's leading markets, such as the EU and the US, and new growth in other markets. These companies are also eager to climb the pharmaceutical value chain to offer more complex products such as therapeutics and other biologics. Indian companies are pursuing these ambitions through opportunities as contract research, development and manufacturing organisations and mergers and acquisitions to gain new technology or access to new markets and other partnerships with biotechnology entities in the US, the EU, Japan and South Korea, among others.

High and Increasing Dependence on China for Manufacturing Inputs

Despite all the interest and initiatives described so far, India's high dependence on China for vital manufacturing inputs has increased. India's imports of active pharmaceutical ingredients (APIs) from China grew from one per cent in 1991 to around 70 per cent in 2019. This dramatic growth in import dependence on China resulted from Indian API manufacturers losing their cost competitiveness for a number of reasons, including stricter pollution control norms in India and large subsidies in China.[25]

India's import dependence on Chinese inputs has persisted even as the former's pharmaceutical industry has boomed. From 2019-20 to 2023-24, India's pharmaceutical exports grew from around US$20 billion[26]

24 The White House, "Fact Sheet: Biden-Harris Administration's Actions to Advance American Biotechnology and Biomanufacturing", 25 June 2024, https://www.whitehouse.gov/ostp/news-updates/2024/06/25/fact-sheet-biden-harris-administrations-actions-to-advance-american-biotechnology-and-biomanufacturing/.

25 PricewaterhouseCoopers (PwC), *Reviving India's API industry*, (April 2020), https://www.pwc.in/assets/pdfs/industries/pharmaceuticals-and-life-sciences/reviving-indias-api-industry.pdf.

26 Pharmexcil, *Handbook 2020*, Supported by the Ministry of Commerce and Industry, Government of India, 2020, https://pharmexcil.com/uploadfile/PharmexcilHandBook2020.pdf.

(S$27 billion) to US$27 billion[27] (S$36.45 billion), respectively. However, during the same period, China's share in India's imports of bulk drugs and intermediates, by quantity, grew from 67 per cent to 76 per cent, respectively.[28]

However, during the same period, China's share in India's imports of bulk drugs and intermediates, by quantity, grew from 67 per cent to 76 per cent, respectively.

Why has there been persistent dependence on China even in recent years, despite industrial policy measures such as the PLI that have come into effect during this time? There are two possible explanations, and the reality likely involves a combination of both.

First, current measures by governments and industry might not be enough. Attracting more supply chains and reducing reliance on China to more acceptable levels will require more efforts and further refinement of ongoing efforts, based on the experience so far.

A second possible explanation is that it is too soon to form a judgement about the effectiveness of ongoing efforts. Many of these efforts have come into play in the last 2-3 years. China took at least a decade, if not longer, to build its vaunted supply chains.[29] And there are some early successes in India, for example, the manufacturing of Penicillin-G in India for the first time in two decades.[30]

Why Supply Chain Reconfiguration is Difficult

India's increased reliance on APIs from China highlights the difficulties in reconfiguring supply chains. India and like-minded partners will need to address three factors in their quest to build more resilient and trusted pharmaceutical supply chains: competitiveness, unpredictability and risks and inertia. These factors, in various forms and combinations, also apply to other manufacturing supply chains.

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27 India Brand Equity Foundation, *Pharmaceutical Exports from India*, (New Delhi: India Brand Equity Foundation, October 2024), https://www.ibef.org/exports/pharmaceutical-exports-from-india.

28 Gireesh Babu, "India's bulk drug imports grow 4.12% in 2023-24, imports from China accounts for almost 72%", *Pharmabiz*, 6 May 2024, https://www.pharmabiz.com/NewsDetails.aspx?aid=168926&sid=1.

29 Ian Colotla, Yvonne Zhou, John Wong, Jeff Walters, Justin Rose, Lars Maecker, "China's Next Leap in Manufacturing", *BCG*, 13 December 2018, https://www.bcg.com/publications/2018/china-next-leap-in-manufacturing.

30 *Business Standard*, "Aurobindo Pharma to start production of Pen-G at its Andhra plant in Q1FY25", 14 March 2024, https://www.business-standard.com/companies/news/aurobindo-pharma-to-start-production-of-pen-g-at-its-andhra-plant-in-q1fy25-124031400331_1.html.

Competitiveness

This cost advantage is due to the impressive economies of scale Chinese entities have built since the early 2000s.

By some estimates, API manufacturing continues to be 30 per cent less expensive in China than in India. This cost advantage is due to the impressive economies of scale Chinese entities have built since the early 2000s. For instance, there are over 7,000 API manufacturers in China, compared to India's 1,500 plants, which indicate fewer than 1,500 API manufacturers, since many manufacturers are likely to operate multiple plants.[31]

WuXi AppTec is the most well-known example of China's dominance in scale. WuXi has around 90,000 litres of single-use bioreactor capacity, with plans to expand to 430,000 litres.[32] There are simply no similarly sized and scaled counterparts to WuXi in India.

Beyond scale, WuXi is also world-leading in R&D capabilities. Leading global pharmaceutical multinational corporations and state-funded laboratories in the US and the EU depend on WuXi for Contract Research Organisation and Contract Development and Manufacturing Organisation capabilities.[33]

Unpredictability and Risks

Businesses thrive on predictability and lower risks. While continuing to operate in China is increasingly unpredictable and risky, diversifying beyond China to countries such as India also involves unknowns. For instance:

- Tariffs: Businesses certainly clamour for lower tariffs. However, they also value stable tariff regimes with clear and predictable enforcement mechanisms, including for customs clearance processes and timelines.

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31 Sonal Bhutra, "Why China has an Edge over India in API Manufacturing", *CNBC TV18*, 15 July 2020, https://www.cnbctv18.com/healthcare/why-china-has-an-edge-over-india-in-api-manufacturing-6331911.htm.

32 "Single Use Reactors", WuXi Biologics, https://www.wuxibiologics.com/featured-platforms/single-use-bioreactors/.

33 Andrew Silver, "US bill poses risk to WuXi AppTec and its Western drugmaker partners", *Reuters*, 6 February 2024, https://www.reuters.com/business/healthcare-pharmaceuticals/us-bill-poses-risk-wuxi-apptec-its-western-drugmaker-partners-2024-02-05/.

- Non-tariff measures and regulations: Beyond tariffs, businesses are enabled by predictable regulatory environments, spanning standards, licences and approvals, among others. Given the global nature of manufacturing supply chains, businesses are also attracted by greater regulatory harmonisation across major economies. Conversely, businesses can find it challenging to move global supply chains to locations with regulations that diverge from major global markets. In India's case, some regulations even diverge across states within the country.

Given the global nature of manufacturing supply chains, businesses are also attracted by greater regulatory harmonisation across major economies.

- Price controls: Essential pharmaceuticals are a public good. Many governments, therefore, look to increase access to pharmaceuticals, including through price controls. However, businesses require sustainable commercial returns for investments. Price regimes, therefore, need to strike a balance between affordability and commercial sustainability.

- Quality: Global companies – headquartered in India or elsewhere – rely on high levels of quality to trust that products sourced from India can reliably be sold in global markets. Instances of sub-standard quality can diminish trust in products from India. For instance, in 2022 and 2023, shipments of eye drops, cough syrups and some other pharmaceuticals from a few Indian companies were linked to cases of serious infections and even deaths in the Gambia, the US and Uzbekistan.

To be sure, governments are increasingly cognisant of the need to address such areas of unpredictability and risks. Policymakers are aware that doing so is necessary to grow their countries' footprint in global pharmaceutical supply chains and also increase access to high-quality healthcare commodities to their own populations.

India, for instance, is exploring means to increase regulatory harmonisation while also considering the reasonable interests of its existing manufacturing base, which includes the impressive generic manufacturing industry. This was one of the aims in the draft bill on drugs, medical devices and cosmetics, a piece of legislation aimed at overhauling the current foundational regulations that date back to

the 1940s.[34] Such an overhaul is complicated by, among other things, opposition from some state governments, which do not want to lose their regulatory mandates.

India also established a pricing committee, comprising representatives of government, industry and other groups, to deliberate on price control mechanisms and bring greater predictability and transparency.

India also established a pricing committee, comprising representatives of government, industry and other groups, to deliberate on price control mechanisms and bring greater predictability and transparency. Additionally, the Indian Ministry of Health and Family Welfare and the Central Drugs Standard Control Organization (CDSCO) are pushing to improve quality assurance mechanisms. For example, the CDSCO now requires manufacturers to comply with World Health Organization's Good Manufacturing Practices and has increased its inspections of production facilities and drug testing laboratories.[35] The agency has even reportedly cancelled the licences of companies and laboratories for shortcomings.[36] And the Indian health ministry is coordinating more closely with the US FDA.

Clearly, much is already being done to address areas of unpredictability and risks. More may be needed, building on these foundations.

Inertia

In addition to the aforementioned factors, some corporate leaders are slow to consider shifting some supply chains to India because of sheer inertia, stemming from two reasons. The first reason is a conscious decision to adopt a 'wait and see' approach, to monitor how the US-China geopolitics play out over the next few years before taking any action, if needed.

The second reason is an unfamiliarity with India. Some companies are now led by executives who last considered India as a manufacturing

34 Press Trust of India, "NITI Aayog recommends Indian standards of drug regulation to be on par with global standards", *Times of India*, 15 April 2023, https://timesofindia.indiatimes.com/india/niti-aayog-recommends-indian-standards-of-drug-regulation-to-be-on-par-with-global-standards/articleshow/99513273.cms.

35 Sohini Das, "CDSCO cracks whip on drug manufacturing units over quality lapses", *Business Standard*, 27 June 2024, https://www.business-standard.com/industry/news/cdsco-tightens-noose-around-quality-lapses-36-of-inspected-units-shutdown-124062700970_1.html.

36 Abhishek Law, "Licenses of 64 pharma companies canceled after government crackdown", *The Hindu BusinessLine*, 19 February 2024, https://www.thehindubusinessline.com/companies/licences-of-64-pharma-companies-cancelled-after-govt-crackdown/article67863507.ece

destination a decade or two ago. Some of these executives may have had bad experiences trying to navigate the Indian system then, impressions that have lasted despite many changes that have occurred since.

What Lies Ahead

What does the future have in store for pharmaceutical supply chains? The answer lies in three sets of factors.

The first is domestic factors, spanning the government and industry:

- Can governments address more areas of unpredictability and risks in order to enable companies to diversify supply chains?

- Can industry in India and like-minded partners do what is needed to compete with WuXi in terms of scale and capabilities?

The second is geopolitical factors. These factors revolve around the US-China competition and what the remainder of Trump's second term has in store. The first two years of Trump's presidency – 2025 and 2026 – may be especially influential, given the trend of US mid-term elections often altering the composition of the Congress. The next mid-terms will occur in November 2026. Trump could well be left with a less favourable Congress thereafter, in addition to going into the last two years of his presidency.

These factors revolve around the US-China competition and what the remainder of Trump's second term has in store.

The third is international partnerships. These factors are contingent on the ability of India, the US and other like-minded partners to build on initial steps such as Transforming Research and Strengthening Technology, the Quad and the Biotechnology Innovation Organization 5 to deliver concrete outcomes in supply chain diversification.

The increasing levels of geopolitical uncertainty mean that policymakers and companies will need to continue closely monitoring developments and taking steps, including diversifying supply chains, to proactively mitigate risks.

Security-centric Vision of Trade and Connectivity: Connecting the Dots for India

R V Anuradha

The Post-World War II Architecture

While not perfect, the three institutions at the heart of global economic governance – the International Monetary Fund (IMF) and the World Bank, which emerged in 1945, and the General Agreement on Tariffs and Trade (GATT) in 1947 – have provided a framework for a predictable set of rules and economic growth worldwide.

The basic underpinning of participation in any international institution involves ceding some degree of sovereign space to a set of multilateral rules, in the shared understanding of their benefit for all.

There are the rule makers and rule takers, and the rule makers are also able to carve out valuable policy space in sensitive areas.

The GATT's evolution into the World Trade Organization (WTO) in 1995 was about more liberalised trade, while also focusing on disciplines on domestic law and policies aimed at minimising their trade-distorting impact. Those rules, by their very nature, had disparate impacts on countries. This is because stronger economic power plays a significant role in the ability to influence rules.[1] There are the rule makers and rule takers, and the rule makers are also able to carve out valuable policy space in sensitive areas. This is perhaps most amply demonstrated in the WTO's Agreement on Agriculture, where the design of the rules has enabled maintenance of high levels of domestic support for farmers in the United States (US) and the European Union (EU), while developing countries like India have been limited to a mere 10 per cent of the value of production. What this means in numbers is that, per farmer, domestic support in the US has been in the range of US$61,286 (S$82,736), US$57,820 (S$78,057) in Switzerland and around US$8,588 (S$11,594) in

1 Daniel S. Hamilton and Jacques Pelkmans, "Rule Makers or Rule Takers? Exploring the Transatlantic Trade and Investment Partnership", Centre for European Policy Studies, 2015, https://www.ceps.eu/ceps-publications/rule-makers-or-rule-takers-exploring-transatlantic-trade-and-investment-partnership/.

the EU – each well over 100 per cent value of production.[2] In contrast, for India, it has been US$282 (S$381) and US$139 (S$188) for Indonesia.[3]

Another beneficiary of substantial government subsidies has been the airline industry. Boeing in the US and Airbus in the EU, availed billions of dollars in subsidies, resulting in prolonged WTO disputes between 2004 and 2021, and a series of retaliatory tariffs. In June 2021, the US and the EU agreed to a cooperative framework which involved the suspension of their retaliatory tariffs for five years and working together to confront the threat from China's non-market practices.[4] While the airline subsidies clearly flouted WTO's rules, the fact that they could be sustained without repercussions over a long period also testifies to the ability of countries to allow for reciprocal favours and concessions. Added to this, the design of the WTO's Agreement on Subsidies and Countervailing Measures (ASCM) also preserved policy space for several government interventions, such as those that are not specific. This allowed for the continuation of financial assistance, which, although considered subsidies in economic terms, was regarded as legitimate under the ASCM. Clearly, countries that can make the most use of such policy space are the ones with economic means to do so. A recent World Bank study noted that China, the EU and the US account for about 75 per cent of the documented number of subsidy measures, followed by Australia and Canada as the world's top subsidisers, and have significant ability to influence global markets.[5]

Clearly, countries that can make the most use of such policy space are the ones with economic means to do so.

This is by no means to undermine the value of globalised trade. Trade distortions caused by subsidies and other forms of support notwithstanding, it is also a fact that increasing and liberalised trade has enhanced inter-connectedness and inter-dependence between countries. The multilateral rules of trade under the WTO provided certainty and predictability, including through a mechanism that could

2 Sachin Kumar Sharma, Teesta Lahiri, Suvayan Neogi and Raihan Akhter, "Revisiting Domestic Support Negotiations at the WTO: Ensuring a Level Playing Field", Working Paper, (Delhi: Centre for WTO Studies, Indian Institute of Foreign Trade, 2020), https://wtocentre.iift.ac.in/workingpaper/WorkingPaper56.pdf.

3 Ibid.

4 Office of the United States Trade Representative, "USTR Announces Joint U.S.-E.U. Cooperative Framework for Large Civil Aircraft", Washington DC: Office of the United States Trade Representative, 15 June 2021, https://ustr.gov/about-us/policy-offices/press-office/press-releases/2021/june/ustr-announces-joint-us-eu-cooperative-framework-large-civil-aircraft. For a timeline of the twin disputes and eventual compromise, see: "Highlights of the 17-year Airbus, Boeing trade war", *Reuters*, 16 June 2021, https://www.reuters.com/world/highlights-17-year-airbus-boeing-trade-war-2021-06-15/.

5 "Unfair Advantage: Distortive Subsidies and their Effects on Global Trade", The World Bank Group, 2023

provide a framework for the enforcement of rights and obligations. India has been a beneficiary of that framework. India's entry into the WTO in 1995 coincided with India's economic liberalisation. Both complemented each other, resulting in India's time of reckoning as a growing economic power in the past few years.

A recent analysis for the IMF notes that while global trade growth slowed after the global financial crisis in 2008-09 and declined sharply at the onset of the pandemic in 2020, since then trade has rebounded to the highest value ever.

At the global level, the WTO estimates that the world trade volume today is roughly 44 times the level recorded in the early days of the GATT (4,400 per cent growth from 1950 to 2023).[6] Between 1995 (when the WTO came into being) and 2023, there has been a steady expansion in world trade volume and value by four per cent and six per cent respectively on average.[7] A recent analysis for the IMF notes that while global trade growth slowed after the global financial crisis in 2008-09 and declined sharply at the onset of the pandemic in 2020, since then trade has rebounded to the highest value ever.[8]

Over 80 per cent of world trade also occurs on a Most Favoured Nation basis, as noted in a recent WTO study, even after considering trade remedies (that is, anti-dumping and countervailing duties), additional duties in the US and China, and the utilisation of trade preferences in trade under preferential trade agreements and bilateral trade flows for 184 economies.[9]

Against this backdrop, this chapter will explore three themes. It will first explore the various dimensions of growing security-centric visions of trade. This will be followed by a discussion on three key technological developments that have a significant impact on the emergence of economic supremacy. And finally, it will assess where India stands and what more it should do.

6 "Evolution of trade under the WTO", World Trade Organization (WTO), https://www.wto.org/english/res_e/statis_e/trade_evolution_e/evolution_trade_wto_e.htm.

7 Ibid.

8 Pinelopi Koujianou Goldberg and Tristan Reed, "Growing Threats to Global Trade", *Finance & Development*, International Monetary Fund (IMF), June 2023, https://www.imf.org/en/Publications/fandd/issues/2023/06/growing-threats-to-global-trade-goldberg-reed.

9 Tomasz Gonciarz and Thomas Verbeet, "Significance of the Most-Favoured Nation Term in World Trade: A Comprehensive Analysis", World Trade Organization (WTO) Staff Working Paper, Geneva: World Trade Organization, 15 January 2025, https://www.wto.org/english/res_e/reser_e/ersd202502_e.htm.

Growing Security-centric Vision and its Impact

Despite the growth and benefits of trade, the growing security-centric approach to trade lies in the perceived belief that the trade rulebook needs an overhaul and rewriting since the existing policy spaces have not been sufficient. This is perhaps most stark in the steps taken by the US to undermine the role of the WTO as the governance institution for international trade. This started with the US blocking appointments to the WTO Appellate Body – a fundamental part of the WTO dispute settlement and enforcement mechanism. This step, which began during US President Donald Trump administration in 2017, continued under the Biden administration and will probably never be reversed. A simultaneous development in the US has been the increasing use of punitive tariffs, couched under the cloak of national security. The US' tariffs on steel and aluminium, on the grounds that national self-resilience necessitates high tariffs in these two sectors, given their role in the defence sector of the country.

A simultaneous development in the US has been the increasing use of punitive tariffs, couched under the cloak of national security.

This was accompanied by geopolitical alliances with like-minded countries under President Joe Biden's administration in the US. The approach of the Indo-Pacific Economic Framework (IPEF) that saw significant progress in the past few years was based on two limbs: (a) that of developing national self-resilience in critical sectors, while also (b) diversifying supply chains towards geopolitically aligned economies, and, thereby, hedging against risks of supply chain disruptions. However, to state the obvious, Trump's second term has upended even those underpinnings and led to a slew of attempts to predict the possible impact of his current thrust on reciprocal tariffs.

A related development has been increasing scrutiny over foreign investments using the national security lens- a development which was crystallised in new and innovative legislative frameworks in the US, the EU, Japan, New Zealand, Australia and Canada. The recent blocking of Japanese investment into the US steel was a stark example of this approach, though the US' rejection of investment from a friendly nation in this instance has sent troubling signals on the extent to which it has shifted from a liberal approach to trade and investment to one that is more inward-looking.

The US is not alone in this discernible shift away from liberalised trade. An article in the *Economist* newspaper in 2016 noted that "…[f]rom

Warsaw to Washington, the political divide that matters is less and less between left and right, and more and more between open and closed. Debates between tax-cutting conservatives and free-spending social democrats have not gone away. However, issues that cross traditional party lines have grown more potent – welcome immigrants or keep them out? Open up to foreign trade or protect domestic industries? Embrace cultural change or resist it?"[10]

There is also the dimension of growing disillusionment with globalisation since the fruits of trade have not benefited all equally.

There is also the dimension of growing disillusionment with globalisation since the fruits of trade have not benefited all equally. As the United Nations Conference on Trade and Development noted in its 2018 Trade and Development Report, "(T)he paradox of twenty-first century globalisation is that – despite an endless stream of talk about its flexibility, efficiency and competitiveness – advanced and developing economies are becoming increasingly brittle, sluggish and fractured."[11] The Report goes on to outline the growing dissatisfaction with the manner in which rules have been formulated and applied, and notes that its most significant beneficiaries have been global businesses whose corporate power has only become more concentrated and enhanced.[12]

The growing disillusionment with globalisation and the rules of trade has been exacerbated during the COVID-19 pandemic. The pandemic-related lockdowns resulted in disruptions along the supply chain, shortages of raw materials and finished goods and increasing prices. This brought to a head the risks of dependencies and the need to hedge those risks by diversifying supply chains, as well as ensuring national capabilities in key sectors. Achieving this, in a closely interdependent and interconnected world, has been a challenge, as the United States' former national security advisor Jake Sullivan acknowledged when he said, "we now live in an era of strategic competition and interdependence".[13]

The US, under the Trump administration, is way past any acknowledgement of these interlinkages, as its thrust is solely on the

10 "Drawbridges Up", *The Economist*, 30 July 2016, https://www.economist.com/briefing/2016/07/30/drawbridges-up.

11 United Nations Conference on Trade and Development (UNCTAD), *Trade and Development Report 2018: Power, Platforms and the Free Trade Delusion*, (Geneva: United Nations, 2018), https://unctad.org/system/files/official-document/tdr2018_en.pdf.

12 Ibid.

13 Jake Sullivan, "The Sources of American Power", *Foreign Affairs*, 24 October 2023, https://www.foreignaffairs.com/united-states/sources-american-power-biden-jake-sullivan.

mantra of 'Make America Great Again' with reciprocal tariffs as its main tool. The Trump instruments of shock and awe through threats, tariff increases, suspensions and dialogue are all still a work in progress whose impact will only manifest over time.

The Trump instruments of shock and awe through threats, tariff increases, suspensions and dialogue are all still a work in progress whose impact will only manifest over time.

However, the story of the security-centric vision is incomplete without examining developments in the EU. Its green deal has aptly been termed as constituting the "EU first agenda".[14] Appropriating to itself the mantle of a moral intervenor,[15] the EU's green deal comprises a cocktail of regulatory instruments, aimed at demanding accountability from imports into the EU to ensure that they match up to the EU's own regulatory mandates applicable to its industry. For example, the EU's Carbon Border Adjustment Measure (CBAM) is aimed at charging all imports with the price differential with the carbon price applicable in the EU for embedded emissions in the imported product. The EU Deforestation Regulation (EUDR) mandates companies trading in cattle, cocoa, coffee, oil palm, rubber, soya and wood, as well as products derived from these commodities, to conduct extensive diligence on the value chain to ensure the goods do not result from deforestation occurring beyond December 2020, forest degradation or breaches of local environmental, human rights and social laws. There are other regulatory directives, including the EU Corporate Sustainability Due Diligence Directive and the Corporate Sustainability Reporting Directive.

Each of these is premised on preserving and enhancing the competitiveness of EU businesses by making industries in the supply chain match up to the EU's level of regulatory requirements. In imposing these requirements on traded products, these directives upend international law in two ways: (a) they undermine the balance of rights and obligations of countries in multilateral environmental agreements; and (b) they seek to use the instrument of trade to impose the EU's vision of environmental compliance. The CBAM, for example, would extract charges based on the EU's level of carbon pricing, even if the level of emissions is the same and has been charged in the country of origin.

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14 Diana Vela Almeida, Vijay Kolinjivadi, Tomaso Ferrando, Brototi Roy, Héctor Herrera, Marcela Vecchione Gonçalves, Gert Van Hecken, "The "Greening" of Empire: The European Green Deal as the EU first agenda", *Political Geography* Volume 105, 2023, https://linkinghub.elsevier.com/retrieve/pii/S0962629823001038.

15 Ibid.

While there are concerns relating to the WTO compatibility of the CBAM and the EUDR, the EU is also pushing for a rethink of the WTO's rules as far as they impact environmental measures. Countries like India have contemplated legal challenges at the WTO but have not actioned this yet.

Impact of Intervening Events

The second area that needs attention is the drivers of technological growth amidst shifting geopolitical scales. Given the fact that both China and the US are economically interdependent, there is also growing analysis that the US' attempts to exclude and isolate China through increasing use of tariffs may, in fact, be backfiring by strengthening China. Three recent developments testify to that.

The first is the case of operating systems (OS) – the underlying software programme necessary for the operation of mobile phones and computers.

The first is the case of operating systems (OS) – the underlying software programme necessary for the operation of mobile phones and computers. Apple's iOS, Google's Android OS and Microsoft's Windows are all examples of OS owned by US technology giants that have predominantly ruled this space. The Chinese technology company Huawei launched the Harmony OS in 2019 in the midst of US sanctions that restricted access to Google's Android OS. Harmony-OS Next, launched in October 2024, now aims to compete with Android and Apple's iOS.

The second is the case of subsea cables. Crucial for the transmission of data, such cables were initially laid down by telecommunication companies; however, in the recent past, the race to own and control such cables has shifted to American tech companies- Google, Amazon, Meta and Microsoft.[16] A recent report notes that the US government has intervened in at least six private undersea cable deals in the Asia-Pacific region over the past four years to keep a Chinese tech company, HMN Tech, from winning that business, or forced the rerouting or abandonment of cables that would have directly linked the US and Chinese territories.[17] The policy to isolate China's high-tech sector, however, seems to be having mixed results. What it will definitely result

16 Adam Satariano, "How the Internet Travels Across Oceans", *The New York Times*, 10 March 2019, https://www.nytimes.com/2019/03/10/technology/internet-cables-oceans.html.

17 Joe Brock, "U.S. and China wage war beneath the waves- over internet cables", *A Reuters Special Report*, 24 March 2023, https://www.reuters.com/investigates/special-report/us-china-tech-cables/.

in is deeper fragmentation and regionalisation of the technological landscape.[18] The emergence of HMN Tech appears to have been, in some part, due to the US' efforts to exclude Chinese entities. China's undersea cable maker Wuhan FiberHome International Technologies is prohibited from purchasing US technology. The US claims that foreign technologies are not needed in the manufacture of undersea cables.[19] It has been estimated that over 20 cables involving Chinese companies are either already laid out or in the pipeline to go live by 2026.[20] To add to the complexities, there are speculations of a shadowy war on subsea cables and pipelines, with three incidents since November 2024 involving damage to subsea cables.[21] Whether the damage was a result of an accident or deliberate sabotage, the incidents also demonstrate the fragility of the subsea infrastructure that constitutes the backbone of data and energy systems worldwide. Added to this power play in marine engineering is China's recent unveiling of a device capable of slicing through the world's most reinforced undersea cables at unprecedented depths.[22]

Added to this power play in marine engineering is China's recent unveiling of a device capable of slicing through the world's most reinforced undersea cables at unprecedented depths.

The third key development is the US versus China race for artificial intelligence (AI) supremacy. An area where the US was thought to be far ahead, the alarm bells on the narrowing of technological gaps between the United States and China were first sounded off in November last year by Eric Schmidt, former Chief Executive Officer of Google, when he noted that Chinese firms have started building powerful chips and matched the US' hardware development.[23] Two months down the line, the announcement of the AI model DeepSeek by a Chinese firm poses a challenge to the US' attempts to curtail Chinese innovation. The irony, however, is that the DeepSeek is not the product of Chinese

18 Economist Intelligence Unit, "How tech regionalization could lead to the splinternet", 18 May 2022, https://www.eiu.com/n/how-tech-regionalisation-could-lead-to-the-splinternet/.

19 Ting-Fang Cheng, Lauly Li, Tsubasa Suruga and Shunsuke Tabeta, "China's Subsea Cable Drive Defies U.S. Sanctions", *Nikkei Asia*, 26 June 2024, https://asia.nikkei.com/spotlight/the-big-story/china-s-undersea-cable-drive-defies-u.s.-sanctions.

20 Ibid.

21 Editorial Board, "The shadowy war on subsea cables and pipelines", *Financial Times*, 15 January 2025, https://www.ft.com/content/b7e6b481-9202-4343-ae03-b563d06433e1.

22 "China unveils underwear kill-switch for the internet", *Economic Times*, 29 March 2025, https://economictimes.indiatimes.com/news/international/global-trends/china-unveils-underwater-kill-switch-for-the-internet-how-this-tech-could-sever-global-.connectivity/articleshow/119705338.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst.

23 William C. Mao and Dhruv T. Patel, "Former Google CEO Eric Schmidt Says U.S. Trails China in AI Development", *The Harvard Crimson*, 19 November 2024, https://www.thecrimson.com/article/2024/11/19/eric-schmidt-china-ai-iop-forum/.

state-sponsored innovation; it is the innovation of a private firm and its founder, without any Chinese government capital backing him. It has, therefore, been called an affront both to American technology prowess and China's state-led innovation model.[24]

The solution to address this, however, through attempts to isolate China, may not be the solution, as recent events indicate.

One of the final publications by US' former administration under Biden, summarised the twin challenges at the global level as a) the economic heft of China and its intent and power to reshape the international order that has governed for the last three-quarters of a century; and b) exacerbating of this problem by the breakneck pace of technological development, global democratic backsliding and greater challenges to global governance.[25] The solution to address this, however, through attempts to isolate China, may not be the solution, as recent events indicate.

Implications for India

The implications for India can been at three levels: India-US relationship, India-China relationship and India's growing prominence globally, including the growth of its bilateral trading relationships.

India's positioning with the US has so far been rooted in the principle of strategic autonomy, while aligning with the US as part of initiatives such as the IPEF and the Mineral Security Partnership, which is aimed at strengthening mineral supply chains. The India-US initiative for Critical and Emerging Technology (iCET) dialogue, which followed this, has resulted in several initiatives involving cooperation, joint research and development and joint investments in a lithium resource project in South America and a rare earths deposit in Africa.[26] While the iCET dialogue may see continuity under the Trump administration, the IPEF itself may not, given Trump's averments during his campaign to 'knock

24 "DeepSeek poses a challenge to Beijing as much as to Silicon Valley", *The Economist*, 29 January 2025, https://www.economist.com/business/2025/01/29/deepseek-poses-a-challenge-to-beijing-as-much-as-to-silicon-valley.

25 United States Department of Commerce (U.S. Department of Commerce), *The Decisive Decade: Advancing National Security at the Department of Commerce*, (Washington DC: U.S. Department of Commerce, December 2024), https://www.commerce.gov/data-and-reports/reports/2024/12/decisive-decade-advancing-national-security-department-commerce.

26 "India-United States Joint Fact Sheet", Ministry of External Affairs, Government of India, New Delhi: Ministry of External Affairs, Government of India, 17 June 2024, https://www.mea.gov.in/Images/jfactsheet.pdf.

out' the IPEF agreement.[27] The thrust instead seems to be on a bilateral mini-trade agreement, negotiations for which are currently ongoing. Any real outcome would possibly depend on the ability of the US to commit to withdrawing the additional tariffs imposed on it since Trump's announcement of reciprocal tariffs, including the additional tariffs on steel and aluminium, and commit to not imposing any further additional tariffs. No assurance from the US, however, can be said to be a reliable one, given Trump's penchant for flipflops.

India's relationship with China has been one of diplomatic stand-off over the past few years, coupled with economic dependence.

India's relationship with China has been one of diplomatic stand-off over the past few years, coupled with economic dependence. The latter is evidenced in an increase in China's share in India's industrial product imports from 21 per cent to 30 per cent in the past 15 years, as documented by a recent study by the Global Trade Research Initiative.[28] In the financial year 2024 alone, China accounted for US$101.8 billion (S$137.43 billion) out of a total of US$672 billion (S$907.2 billion) of India's merchandise imports, the bulk of which were industrial products ranging from telecom and electronics, industrial machinery, to chemicals and pharmaceuticals.[29] The report notes that there are both strategic economic and national security dimensions of this dependency.[30] This would also significantly dent any real possibility of India substituting China as an alternative source for manufacturing. The *2023-24 Economic Survey* also highlights the 'single-source concentration risk' arising from India's dependence on China for several products, and vulnerability to potential supply chain disruptions, price fluctuations and currency risks.[31]

India-China's diplomatic relations have seen a thaw since the beginning of the year.[32] The close engagement between both countries on trade

27 Mark R Ludwikowski, R. Kevin Williams and Sally Alghazali, "Trade Policy Following Trump's 2024 Election Victory", *Reuters*, 19 November 2024, https://www.reuters.com/legal/legalindustry/trade-policy-following-trumps-2024-election-victory-2024-11-19/.

28 Global Trade Research Initiative (GTRI), *An Examination of India's Growing Industrial Sector Imports from China*, New Delhi: Global Trade Research Initiative, 29 April 2024, 7-8.

29 Ibid.

30 Ibid.

31 Ministry of Finance, Government of India, *Economic Survey 2024-25*, (New Delhi: Ministry of Finance, Government of India, January 2025), https://www.indiabudget.gov.in/economicsurvey/doc/echapter.pdf.

32 Ministry of External Affairs, Government of India, *Visit of Foreign Secretary to China*, Media Briefing, New Delhi: Ministry of External Affairs, Government of India, 27 January 2025, https://www.mea.gov.in/press-releases.htm?dtl=38946.

and economic issues through the BRICS and Shanghai Cooperation Organization, also opens up newer venues for dialogue and discussion.

The BRICS is not a trade grouping; yet its positioning of economies from the Global South presents a potential diplomatic counter to a US-dominated order.

India's strategic engagement with other economies has increased significantly, with its growing economic prominence. This includes India's engagement in the Quadrilateral Security Dialogue (with Australia, Japan and the US), the India-Middle East-Europe Economic Corridor and the BRICS. Among these, the BRICS, initially comprising the members in its acronym – Brazil, Russia, India, China and South Africa – has gradually been expanding with the United Arab Emirates (UAE), Egypt, Ethiopia, Iran and Indonesia joining in the past 12 months. The BRICS is not a trade grouping; yet its positioning of economies from the Global South presents a potential diplomatic counter to a US-dominated order. One of its significant moves at introducing a BRICS currency based on blockchain technology, however, seems to have taken a backseat with Trump threatening punitive retaliatory tariffs.[33]

On the trade negotiations front, bilateral trade engagements have been seeing an increasing pace and vigour, with India concluding agreements with the European Free Trade Association, Australia, the UAE and Mauritius in the past five years, and is amid intensive negotiations with the United Kingdom and EU, and, more recently, with the US.

India's vision for self-resilience and self-reliance through an 'Atmanirbhar Bharat' has been accompanied by several domestic policy initiatives, such as the Production Linked Incentive schemes, a fresh reinvigoration for micro, small and medium enterprise support, and the development of district hubs for exports under the Foreign Trade Policy 2023. The Budget for 2025-26 takes several more strides in this regard with the announcement of a National Manufacturing Mission to support small, medium and large industries.[34] The Budget's incentives for clean technologies, domestic value addition for solar photovoltaic cells,

33 "Reliance on dollar not weakened: India steers clear of any BRICS currency move amid Trump's big warning", *Economic Times*, 22 March 2025, https://economictimes.indiatimes.com/news/economy/policy/reliance-on-dollar-not-weakened-india-steers-clear-of-any-brics-currency-move-amid-trumps-big-warning/articleshow/119328362.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst.

34 Press Information Bureau, Government of India, *National Manufacturing Mission to cover small, medium and large industries for furthering "Make in India" announced in Union Budget 2025-26*, (New Delhi: Press Information Bureau, Government of India, 1 February 2025), https://www.pib.gov.in/PressReleasePage.aspx?PRID=2098392.

electric vehicle batteries, wind turbines and electrolysis, are expected to provide the thrust for clean technology investments. Added to this is the focus on electronic component manufacturing, which obtained a significant outlay of production-linked incentives.[35]

The World Bank, in its country review of India, notes that India's emergence as one of the fastest growing major economies provides an opportunity to harness India's global trade potential in IT, business services, pharma, electronics and green technology products, as well as labour-intensive sectors such as textiles, apparel and footwear.[36] India's 2023 G20 presidency was an important milestone in its role as a global leader. However, where India has been dithering is in the multilateral sphere. India's External Affairs Minister S Jaishankar noted that "though committed to multilateralism, India also has to deal with the reality of greater competition and deeper gridlock in the world."[37] While this is true, the importance of a multilateral framework is far more important for developing countries like India. The collective strength of countries to present a united front to safeguard collective interests can be done only in a multilateral framework.

The collective strength of countries to present a united front to safeguard collective interests can be done only in a multilateral framework.

India's domestic policy choices and its external engagements indicate its willingness to navigate the complex waves of a shifting world order. Where perhaps its reticence is in stark focus, it is in the multilateral rules of trade. To hold all the disparate elements of a rapidly changing global landscape together, there is a need for an overall framework of rules at the multilateral level, which is rapidly being undermined. Those rules are not going to remain static. And this shall be the focus of the third limb of this chapter.

35 "Cabinet approves Electronics Component Manufacturing Scheme for making India Atmanirbhar in electronics supply chain", Press Information Bureau, Government of India, 28 March 2025, https://pib.gov.in/PressReleasePage.aspx?PRID=2116172#:~:text=This%20scheme%20aims%20to%20develop,Global%20Value%20Chains%20(GVCs).

36 The World Bank Group, "India Overview", 16 September 2024, https://www.worldbank.crg/en/country/india/overview.

37 "Remarks by External Affairs Minister, Dr S Jaishankar at Nani Palkhivala Memorial Lecture 'India and the World'", Ministry of External Affairs, Government of India, 18 January 2025, https://www.mea.gov.in/Speeches-Statements.htm?dtl=38925+Remarks+by+External+Affairs+Minister+Dr+S+Jaishankar+at+Nani+Palkhivala+Memorial+Lecture+India+and+the+World.

India and the World Trade Organization

While services' domestic regulations concluded with a formal outcome among the proponents, the others have deepened discussions with draft legal texts.

India's reticence in WTO negotiations in the past few years has led to its own diminishing role in the multilateral trading system. While the WTO dispute settlement system continues to be beleaguered with a non-functional appellate mechanism, the negotiating capital of a significant portion of the WTO membership has focused its discussions on a range of issues that India is not a part of. These include what started as joint initiatives of a few members in a few distinct areas, such as services, domestic regulation, trade and environment sustainability, structured discussions, investment facilitation, electronic commerce, MSME and gender. Negotiations on each of these have deepened since 2017. While services' domestic regulations concluded with a formal outcome among the proponents, the others have deepened discussions with draft legal texts.

There are two other critical areas of development at the WTO. One is the Trade and Environmental Sustainability Structured Discussions, where the EU, the US, Japan and China, among more than 78 WTO members, are active participants. The second is informal discussions among members on industrial policy. As with the joint initiatives, India continues to remain outside of these negotiations.

India emphasises the importance of a rules-based multilateral trading system,[38] but is simply not engaging in the form and shape of those rules in a fast-changing global landscape. Once seen as a leader of developing countries, India's adamant refusal to engage in key areas of ongoing negotiations at the WTO is a classic case of abdicating an opportunity by emphasising form over substance. India's principal concern since 2017, when the negotiations on these areas commenced, has been that this was not accompanied by a mandate from all WTO members and that initiatives such as this undermine multilateralism. However, staying out of the negotiating room for the past seven years has only resulted in obviating any possibility that may have been there to influence the content of the rules and inform the WTO members of the multiple dimensions that need deeper consideration. All this, while the

38 G20, *New Delhi Leaders' Declaration*, (New Delhi: G20, 9-10 September 2023), para 19, https://www.mea.gov.in/Images/CPV/G20-New-Delhi-Leaders-Declaration.pdf.

membership of each of the initiatives has only increased, with several developed and developing country members being part of the groups. The EU and China are members of each of these groups, playing an active role in rulemaking, while the US has so far been engaged in all except for investment facilitation.

Concluding Thoughts – What Next?

Unpredictability and uncertainty appear to be the only two certainties with regard to the US' impending 'Liberation Day' – 2 April 2025 – when it has threatened to significantly enhance tariffs. The US is the world's largest economy and, by its own estimate, the second-largest trading nation in the world, only behind China.[39] The US' moves of undermining multilateral rules of trade, imposing unilateral and WTO-incompatible tariffs and rendering the WTO's dispute settlement toothless are events that have shaken the world order. And yet, in a vastly interconnected world, the political vagaries of one country, even when it accounts for a vast proportion of world trade, may not be sufficient to unravel that interconnectedness. Ultimately, it is in every country's self-interest to ensure the presence of a rules-based order.

The US' moves of undermining multilateral rules of trade, imposing unilateral and WTO-incompatible tariffs and rendering the WTO's dispute settlement toothless are events that have shaken the world order.

The global rules-based order is where India needs to play a more active role and not let the EU and China take predominant positions in that.

In the 1947 story that led to the birth of GATT, and even in the 1990s story of the emergence of the WTO, India's role was arguably limited. But it is now poised at a stage of promising economic growth. Rather than merely following rules, it needs to play a more active role in setting those rules. India's mantra for going forward should be clear - unshackling our reticence in rewriting the multilateral trade rules.

39 Office of the United States Trade Representative (USTR), "Countries and Regions", https://ustr.gov/countries-regions.

Appendix 1
About the Editors

Dr Amitendu Palit is a Senior Research Fellow and Research Lead (Trade and Economics) at the Institute of South Asian Studies at the National University of Singapore. He is an economist specialising in international trade and investment policies, free trade agreements, supply chains, connectivity, cross-border data flows and the Indian economy. He sits on the World Economic Forum's Global Future Council on Trade and Investment. He is Senior Research Fellow (Honorary) at the Wong Centre for the Study of MNCs and Adviser for Athena Infonomics.

Earlier, Dr Palit worked for several years in the India Ministry of Finance and in the Ministries of Industry and Civil Supplies. He handled macroeconomic policies, including trade, investment, industrial development, small and medium enterprise, entrepreneurship and futures trading. He wrote annual economic surveys and participated in annual budgetary consultations. He was on the Advisory Committees of the Planning Commission of India and the International Labour Organization (ILO).

Dr Palit has edited and authored several books. The latest ones are *Seeking Middle Ground: Land, Markets and Public Policy* (OUP, 2019; co-edited); *Seven Decades of Independent India* (Penguin, 2018; co-edited) and *Employment Policy in Emerging Economies* (Routledge, 2017; co-edited). His other books include *The Trans-Pacific Partnership, China and India: Economic and Political Implications* (Routledge, 2014), *China India Economics: Challenges, Competition and Collaboration* (Routledge, 2011) *and Special Economic Zones in India: Myths and Realities* (Anthem Press, 2008; co-authored). He has published in several peer-reviewed academic journals. He is a columnist for India's *Financial Express* and a regular contributor for East-West Centre, East Asia Forum and *China Daily*. He is an expert for BBC, Bloomberg News, CNA, CNBC, ABC, CGTN and Doordarshan (India). He has been a resource person for the Commonwealth Secretariat, ILO, United Nations Development Programme, Copenhagen Consensus and IIFT India.

Mr Saeeduddin Faridi is a Research Analyst at the Institute of South Asian Studies (ISAS) at the National University of Singapore. His research focus includes green hydrogen, energy transition and environmental governance. Prior to joining ISAS, Mr Faridi was a research associate at the Council for Strategic and Defence Research in New Delhi, where his work focused on nontraditional security in South Asia and the Indo-Pacific region. He has also worked as a researcher at Gateway House, Mumbai, engaging in research on green hydrogen, critical minerals supply chains and economic security.

He holds a Master's degree in International Politics from the School of Oriental and African Studies, University of London.

Appendix 2
About the Authors

Ms R V Anuradha is a Partner at Clarus Law Associates, New Delhi and specialises in international economic laws and environmental laws. She advises both governments and the private sector and is a consultant to the International Trade Centre. She teaches and writes regularly and is associated as external faculty with the World Trade Institute, Berne, as well as several law schools in India.

Ms Archana Chaudhary is a New Delhi-based climate professional, visiting faculty and sustainability consultant. Before her current assignment as Associate Director at Climate Trends, she covered climate change, economics, trade and foreign policy for *Bloomberg News* for 17 years. She has won multiple awards for her reporting on economics and climate change. She currently works on research and strategic communication on India's climate policy.

Professor Purnamita Dasgupta is Chair Professor and Head, Environmental Economics Unit, at the Institute of Economic Growth, New Delhi, India. Her research and teaching focus on the relationship between environment and economic development, with a special focus on the concerns of climate change, human health and sustainability. She specialises in applying economic models for costing, valuation and financial analysis while working in interdisciplinary teams. Her research has been funded by grants from the Indian government and several international agencies.

She has experience working in different countries in South Asia. She has been a Visiting Professor at the University of Cambridge, United Kingdom and Johns Hopkins University, United States. She has been a Coordinating Lead Author of the Intergovernmental Panel on Climate Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. She has served on several committees of the Indian government, including those involved with drafting E-waste legislation, net present value for forests, national environmental standards, natural resource accounting, India's LT-LEDS; the India Climate and Energy Modelling Forum and the working group on net zero transitions at the NITI Aayog.

Professor Dasgupta's publications include books and peer-reviewed articles in international journals, and she serves on several international editorial boards and academic committees.

Dr Kaushik Deb leads the Energy Policy Institute at the University of Chicago's India team (EPIC India) as the Executive Director. As an applied economist with over 25 years of experience, he has a distinguished career as a strategic advisor to governments and corporates on policy, markets, equity, access and technology developments.

Prior to joining EPIC India, he directed the India Program at Columbia University's Center on Global Energy Policy. His previous roles include serving as Program Director at the King Abdullah Petroleum Studies and Research Center, where he managed research on global oil, natural gas, hydrogen and petrochemicals markets. Additionally, he has led research on low carbon fuels and climate issues in Group Economics in BP Plc, the Policy Group in IDFC and at TERI. He also established sustainability-focused management leadership programs at TERI University (now TERI SAS).

Dr Deb holds a DSc from ETH Zürich and a Master's degree in economics from the Delhi School of Economics.

Dr Gopal Nadadur is Senior Vice President for South Asia at The Asia Group. He also serves as a Senior Fellow with the Atlantic Council's South Asia Center and is an alumnus of the Raisina Young Fellows program.

Prior to joining The Asia Group, Dr Nadadur served as a researcher and policy expert with NITI Aayog, the premier policy think tank of the Indian government, working on aspects of India's industrial and trade policies. He was also a Research Assistant to Former United States (US) Secretary of Defense Ash Carter and to Former US Ambassador to India Rich Verma at Harvard's Belfer Center for Science and International Affairs, focusing on topics ranging from U.S.-India relations to emerging technology policy.

Prior to these roles, Dr Nadadur worked with the Clinton Health Access Initiative, Gavi (the Vaccine Alliance) and other global health agencies, applying market shaping to increase access to healthcare while ensuring commercial sustainability for businesses.

Dr Nadadur earned a PhD in mechanical engineering (product design) from the Pennsylvania State University, a Master in Public Administration in International Development from Harvard University's Kennedy School of Government and a Bachelor in Engineering from R V College of Engineering. He is a proud alumnus of India's Kendriya Vidyalaya system.

Mr Suyash Nandgaonkar is a Senior Research and Policy Associate at Energy Policy Institute at the University of Chicago's India team. His research interests lie at the energy-water-food nexus. He has expertise in connecting data and political-economic theory to interdisciplinary policy requirements. He brings in evaluation frameworks, evidence-based future planning and connects global and local perspectives for sustainable development challenges.

Mr M Rajeshwar Rao demitted office as the Deputy Governor of the Reserve Bank of India (RBI) on 8 October 2025, after completing a distinguished tenure of five years in the position and over 41 years of exemplary service in the RBI.

Mr Rao took charge as Deputy Governor on 9 October 2020. Prior to his elevation to this role, he served as the Executive Director of the RBI. During his tenure as Deputy Governor, Mr Rao provided strategic leadership and policy direction to several critical departments, including the Department of Regulation, Secretary's Department, Enforcement Department, Legal Department and Risk Monitoring Department. He also represented the RBI in various eminent international forums such as the Financial Stability Board and the Network for Greening the Financial System.

A career central banker, Mr Rao joined the RBI in 1984 and held a wide range of key assignments during his illustrious career. As Executive Director, he oversaw the Financial Markets Operations Department, International Department, Internal Debt Management Department and the Secretary's Department. Earlier, he served as the Chief General Manager of the Financial Markets Operations Department and headed the Risk Monitoring Department.

Mr Rao has also served as Banking Ombudsman in New Delhi and worked in several important departments, including the Foreign Exchange Department and the Department of Banking Regulation. His experience across the RBI's regional offices at Ahmedabad, Hyderabad, Chennai and New Delhi enriched his understanding of the Indian financial system and its regional dynamics.

An alumnus of the University of Cochin, Mr Rao holds a Bachelor's degree in Economics and a Master of Business Administration. He is also a Certificated Associate of the Indian Institute of Bankers.

Throughout his over four-decade-long association with the RBI, Mr Rao made significant contributions to the formulation and implementation of key regulatory, supervisory and policy measures, leaving a lasting imprint on India's banking and financial landscape.

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