Green Development Outlook of the Global South 2026

Joining Hands for a Climate-Resilient Future

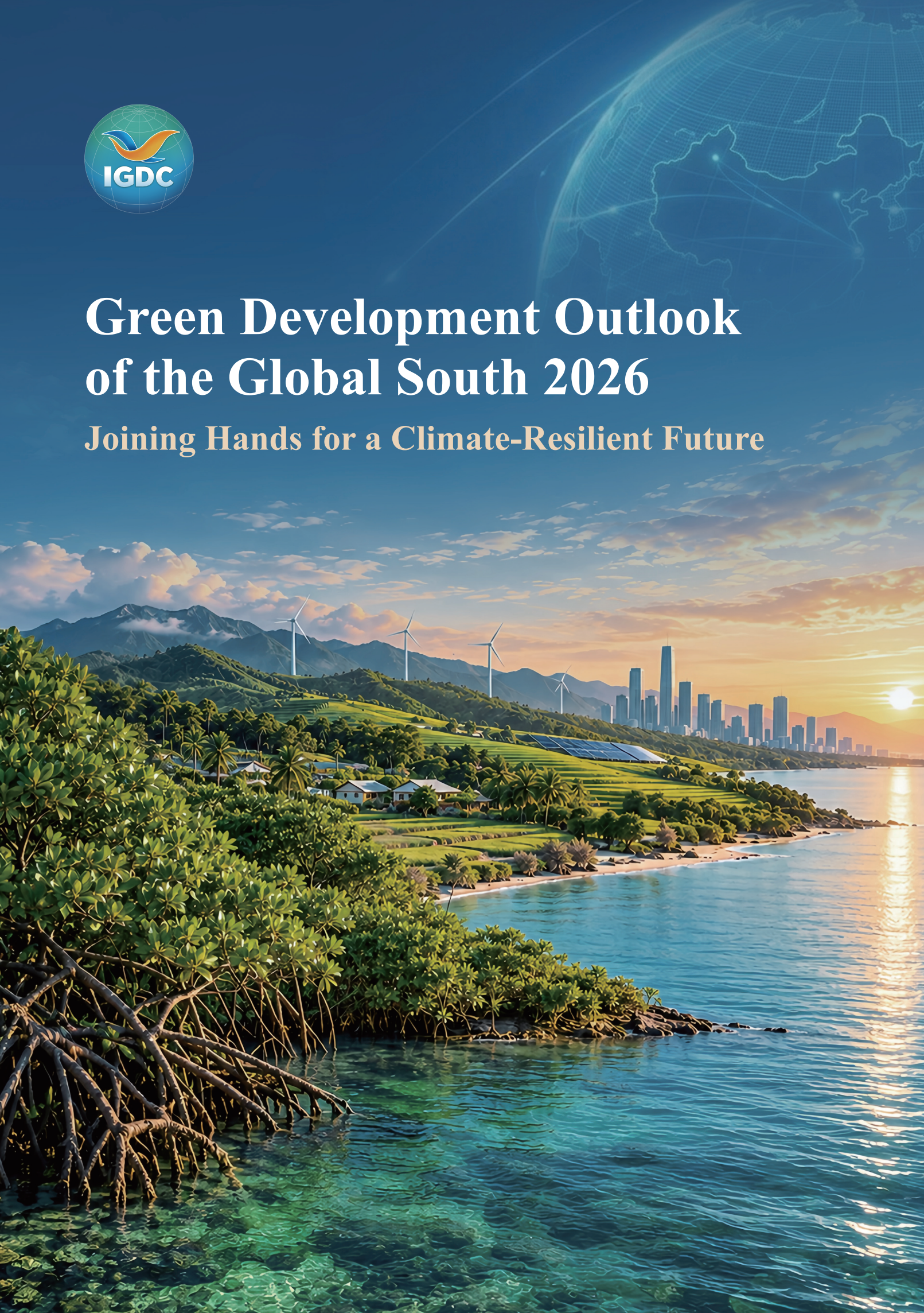


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Climate change is intensifying risks worldwide. Extreme weather events, including heatwaves, floods, droughts and storm surges, are occurring with increasing frequency and are posing a growing challenge to global sustainable development. Global South countries are hit especially hard: limited finance, limited access to technology, and weak governance capacity compound their exposure, and climate adaptation has become an urgent necessity for protecting livelihoods, maintaining economic and social stability, and pursuing sustainable development.

Building climate resilience is both a practical response to climate risk and an opportunity to advance green development and deepen international cooperation. High-quality Belt and Road cooperation provides an important platform for strengthening climate adaptation cooperation among Global South countries. Looking ahead, efforts should be guided by the principle of common but differentiated responsibilities and supported by enhanced provision of finance, technology and capacity-building assistance. Cooperation should be tailored to the specific needs and circumstances of individual countries and regions, with a view to developing practical and effective approaches to building climate resilience. Climate adaptation should be more fully integrated into green development and international cooperation, contributing to a safer, more inclusive and more sustainable Green Belt and Road.

1. Global Green Development Landscape and the Changing Role of the Global South

The global green transition is accelerating. The Global South has become a constructive force driving that transition and reshaping the climate governance system, and it now has historic opportunities in technology, resources, and South-South cooperation. Constrained by finance, technology, and governance, however, its green transition still faces serious challenges.

1.1 Structural Imbalance in the Green Transition

In the green transition, the Global South confronts a question of fairness between its development needs and its mitigation responsibilities. Developed countries account for 79% of cumulative historical carbon emissions (about 58% when using high-income economies as the reference group) and control the core resources green development requires, including technology and financial capital. They lead in setting low-carbon rules and occupy a commanding position in the global green transition. The Global South, for

all its resource wealth, is forced into the role of raw-material exporter in the global division of labor, faces heavier transition pressure, and carries a disproportionate governance burden. Its green transition is constrained by technology and capital barriers erected by developed countries, which have not provided commensurate finance, technology, or industrial support, falling well short of the principle of common but differentiated responsibilities. This gap between where resources sit and where the burden falls is the central imbalance in today's green transition.

Developed countries seek to impose their own transition rules and standards on developing countries through unilateral policy instruments, deepening that imbalance. The most prominent example is the European Union's Carbon Border Adjustment Mechanism (CBAM), which entered its definitive phase on 1 January 2026. According to estimates from a study by the Australian National University, once CBAM enters its definitive phase, the annual costs associated with exports to the EU would amount to about US$1.65 billion for India, US$234 million for Indonesia, and US$659 million for Vietnam (paid by EU importers, with costs passed along supply chains), squeezing export competitiveness and the fiscal space available for green transition financing to varying degrees.

1.2 Three Converging Opportunities for the Green Transition

Although the Global South's green transition still faces multiple constraints, technological breakthroughs, resource endowments, and deepening South-South cooperation are opening a new window of strategic opportunity for its green development.

Technological breakthroughs have sharply reduced the cost of renewable energy, shifting green development from policy-driven to economically self-sustaining. Data from the International Renewable Energy Agency (IRENA) show that since 2010 the cost of solar photovoltaics has fallen 89% and onshore wind 71%; in 2025 the global average levelised cost of solar PV was about US$44/MWh and onshore wind about US$33/MWh. More than 90% of the utility-scale renewable capacity added in 2025 was cheaper than the lowest-cost newly built fossil-fuel plant, making renewables the cheapest source of power in most markets. Falling costs have made renewables a commercially competitive choice. For the Global South, this cost revolution has significantly lowered the barriers to the green transition and turned late-mover disadvantage into a historic opportunity for leapfrog development.



Figure 1 Changes in the levelised cost of renewable power (Source: IRENA)

The Global South holds the vast majority of the world's clean energy and critical mineral resources, which provides the basic conditions for its green transition. Africa, for example, holds about 60% of the world's high-quality solar resources and nearly 30% of critical mineral reserves, with particularly high shares of cobalt, manganese, and natural graphite; the Democratic Republic of the Congo accounts for about 55% of global cobalt reserves. Argentina, Bolivia, and Chile together hold more than half of the world's lithium resources, and Indonesia and the Philippines dominate global nickel mining. As the green transition advances, the strategic value of these resources keeps rising. With stronger local processing, technological capability, and industrial innovation, the Global South can turn its resource advantage into a durable driver of green development.

South-South cooperation provides vital support as the Global South confronts external constraints and advances its green transition. BRICS completed a new round of expansion in 2024, and Indonesia became a full member in January 2025, establishing the framework of "greater BRICS cooperation." The expanded grouping accounts for about 46% of the world's population and, on a purchasing-power-parity basis, about 38% of global GDP. It brings together the Global South's principal energy producers and consumers and its new-energy leaders, offering a broader platform for deepening green industrial collaboration and exchanges on policy and technology. Developing countries that lead in green technology, such as China and India, supply other Global South countries with low-carbon technologies priced to local needs, financing support for green projects, and experience in project construction and operation. Effective South-South cooperation strengthens the Global South's autonomy in green technology, finance, and industrial chains, providing support for advancing the green transition.

1.3 The Changing Role of the Global South in the Green Transition

The Global South and developed countries have different priorities for the green transition. For developed countries, the transition is largely a matter of finding new growth for established industries, an industrial upgrading strategy for the post-industrial era; its core logic has shifted from "sharing the cost of mitigation" to "competing for the decarbonization dividend." For the Global South, the transition bears on the right to survival and development. Its central aim is to use the green transition to drive industrialization and build local capacity rather than remain a supplier of raw materials, answering the question of how to achieve industrialization and modernization without being denied the space to develop.

The Global South's role in the green transition is therefore changing. Many countries are no longer content to supply critical minerals; they aim to upgrade their industries by developing green sectors and to move into higher value-added segments of the global green supply chain. New investment in power generation in the Global South has also shifted from fossil fuels to clean energy, as countries deploy clean energy assets on their own initiative to reduce dependence on imported fossil fuels. Research by the Rocky Mountain Institute (RMI) estimates that about 87% of capital expenditure on power generation in the Global South went to clean energy in 2024, up from roughly 50% a decade earlier (covering Latin America, Africa, South Asia, and Southeast Asia; figures are estimates).

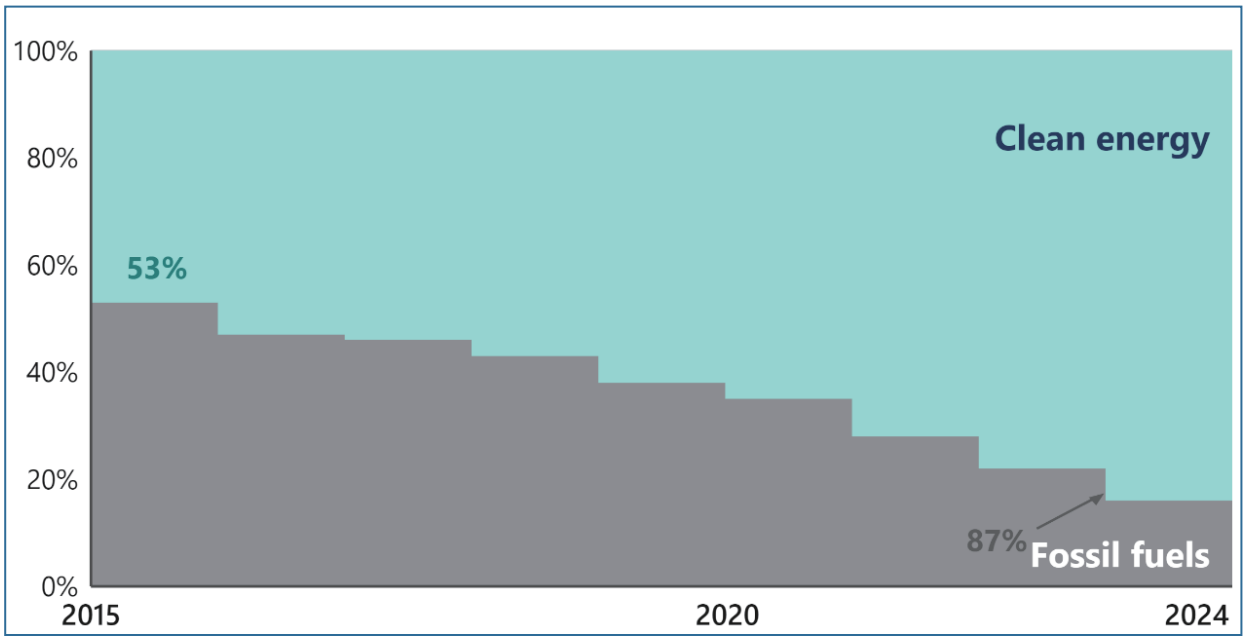


Figure 2 Capital expenditure on power generation in the Global South (Source: Rocky Mountain Institute)

World Trade Organization (WTO) data show that South-South trade grew 8% year on year in the first half of 2025 in current US dollar terms, outpacing the 6% growth of global merchandise trade. Trade in green technology products and clean energy services expanded faster still, making it the most dynamic segment of the global green supply chain. China has become a core contributor to the green transition in the Global South: it has delivered more than 300 capacity-building programs, providing more than 10,000 training places for participants from over 120 developing countries, and has established regional cooperation mechanisms including BRICS, the Shanghai Cooperation Organization, ASEAN, and the African Continental Free Trade Area, extending the reach of South-South cooperation and providing support in technical standards, project finance, and market access.

The Global South's role on the international stage is changing as well. Some countries have moved from passively accepting established rules to shaping their evolution through funds, cooperation mechanisms, and dialogue platforms. During the 30th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP30), the Tropical Forest Forever Facility, designed under developing-country leadership, was formally launched with initial funding of more than US$6.7 billion, and 66 countries signed its launch declaration. The Open Coalition on Compliance Carbon Markets, jointly launched by China, Brazil and the European Union, has drawn 11 members and 18 observers, including the United Kingdom and Canada, representing economies and international organizations across a wide range of regions, providing a platform for linking carbon pricing mechanisms worldwide.



2. New Climate Risk Dynamics and the Systemic Impact on Development in the Global South

As the global climate crisis worsens, the real and potential threats posed by climate change have become the most prominent constraint on green development in the Global South. Climate adaptation refers to adjustments by human and natural systems to actual or expected climate and its effects, in order to moderate harm or take advantage of beneficial opportunities. Under present conditions, adaptation is no longer a supplementary goal of green development but a strategic necessity on a par with mitigation, bearing directly on the right to development, equity, and livelihood improvement. The Global South cannot afford to "mitigate first and adapt later". The earlier adaptation is planned, the lower the long-term total cost and the more efficiently scarce resources can be used.[1]

2.1 Climate Risk Has Become a Pressing Reality for Global South Countries

The global climate system is changing rapidly, with numerous indicators reaching record levels. In 2024, the global mean near-surface temperature was 1.55±0.13°C above the pre-industrial average, the hottest year since records began; 2025 was 1.43±0.13°C above the pre-industrial baseline; and the period from 2015 to 2025 was the warmest 11-year period on record. The United Nations Environment Programme (UNEP) report Limiting Overshoot notes that global warming will exceed 1.5°C above pre-industrial levels in the coming years, with peak warming reaching about 1.8°C even under the most optimistic scenarios, lifting climate risks and impacts to dangerous new levels. In 2024 the global average atmospheric CO2 concentration reached 423.9 ppm, or 152% of the pre-industrial level and the highest in at least 800,000 years. Locked-in impacts such as ocean warming, cryosphere loss, and sea-level rise continue to unfold: the rate of global sea-level rise has accelerated from 2.65 mm per year in 1993–2011 to 4.75 mm per year in 2012–2025. These changes show that climate risk is not a problem for the future; it is a development constraint the Global South must confront now.[2345]

1 Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the IPCC* (Geneva: IPCC, 2022).

2 World Meteorological Organization (WMO), *State of the Global Climate 2024* (Geneva: WMO, 2025).

3 WMO, State of the Global Climate 2025 (Geneva: WMO, 2026).

4 United Nations Environment Programme (UNEP), *Limiting Overshoot: Navigating Exceedance of 1.5°C and Pathways toward Return* (Nairobi: UNEP, 2026).

5 World Weather Attribution and Climate Central, "When Risks Become Reality: Extreme Weather in 2024," December 2024, accessed September 23, 2026, https://www.worldweatherattribution.org/when-risks-become-reality-extreme-weather-in-2024/.

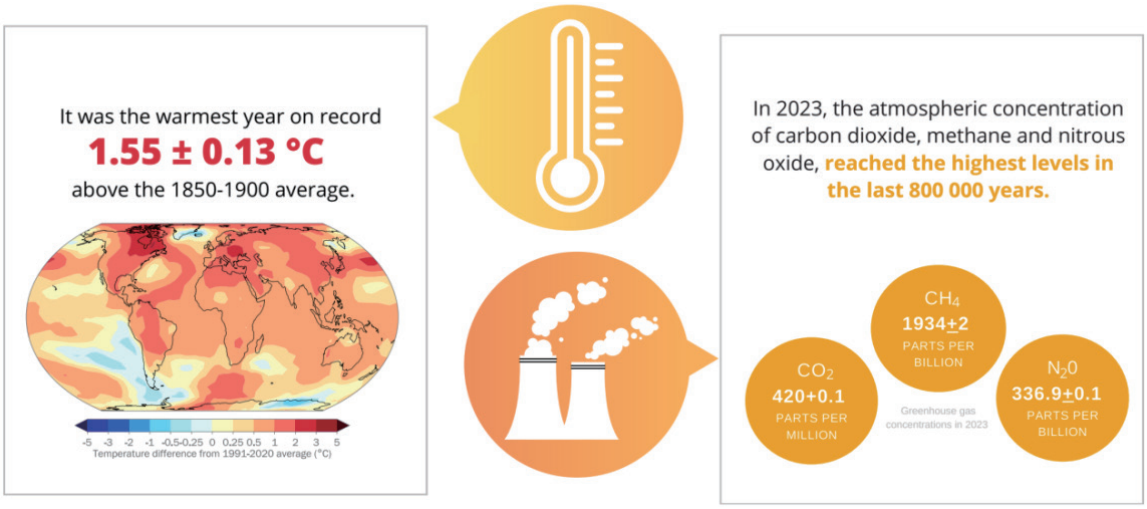


Figure 3 Global average temperature and major greenhouse gas concentrations, 2024

Extreme weather events have also become markedly more frequent. In 2024, 151 "unprecedented" extreme climate events occurred worldwide, and Germanwatch's Climate Risk Index 2026 records more than 9,700 extreme weather events worldwide between 1995 and 2024, causing over 832,000 deaths and US$4.5 trillion in direct economic losses, with the Global South accounting for more than 90% of the deaths. Table 1 compares deaths and economic losses across types of extreme weather event. For many countries, disaster losses are no longer an occasional shock but a recurring drain on development gains, which means that inadequate adaptive capacity directly weakens economic growth, fiscal stability, and livelihood security.

Table 1 Deaths and economic losses by type of extreme weather event, 1995–2024

Hazard type	Global deaths	Economic losses (US$ billion, inflation-adjusted)
Heatwave	278,395	32.9
Storm	274,753	2637.3
Flood	205,452	1314.0
Drought	25,283	287.0
Wildfire	2,791	177.6
Other	45,611	65.0
Total	832,285	4513.8

Over the medium and long term, UNEP's Emissions Gap Report 2025 concludes that if countries maintain current carbon policies, global warming will reach 2.8°C by 2100, and 2.3–2.5°C if all countries fully implement their nationally determined contributions (NDCs). If warming exceeds 1.5°C, the window for adaptation will narrow further; beyond 2°C, some regions will be unable to adapt. Regardless of how fast global emissions fall, the warming already under way and the ocean warming, cryosphere loss, and sea-level rise it has triggered are long-lasting and in places irreversible, and medium- and long-term disaster risk is already locked in. For the Global South, strengthening climate resilience cannot wait: adaptation action must be built into development planning earlier and more systematically.[6][7][8]

2.2 The Systemic Impact of Climate Change on the Global South

Much of the Global South lies in the world's climate-vulnerable zones, mainly monsoon regions, arid and semi-arid areas, low-lying coastal areas, and ecologically sensitive belts. Through more frequent extreme weather, a restructuring of temperature and precipitation patterns, and ecosystem degradation, climate change transmits a cross-sectoral, systemic shock to economies, livelihoods, infrastructure, food security, and water supply, and both the intensity and the reach of that shock keep growing, steadily eroding the Global South's capacity to develop.

(1) Impact on macroeconomic growth and industrial systems: sustained erosion of growth momentum

Climate disasters have become routine and keep eroding the gains from economic growth. As noted above, both deaths and direct economic losses from the extreme weather disasters recorded worldwide between 1995 and 2024 in Germanwatch's Climate Risk Index 2026 were heavily concentrated in the Global South. Repeated shocks push up production and operating costs and weaken industrial competitiveness; for some small island states and least developed countries, a single major disaster can exceed 20% of annual GDP, wiping out years of growth. In Indonesia, the world's largest archipelagic state, sea-level rise and coastal erosion continue to threaten coastal ports, port-adjacent industrial zones, and palm-oil processing clusters, with annual losses from marine disasters exceeding 1% of GDP. Governments are forced to spend more on relief and reconstruction, crowding out other development budgets and creating a vicious cycle of "climate disaster–fiscal deficit–inability to transform." Research by the International Monetary Fund (IMF) shows that debt-default risk in climate-vulnerable countries is more than twice that of other developing countries, further evidence of the damage climate disasters inflict on growth.[9][10]

6 UNEP, *Emissions Gap Report 2025: Off Target* (Nairobi: UNEP, 2025).

7 IPCC, *Climate Change 2023: Synthesis Report* (Geneva: IPCC, 2023), doi:10.59327/IPCC/AR6-9789291691647.

8 Climate resilience refers to the capacity of social, economic, and natural systems to respond to a hazardous event, trend, or disturbance related to climate in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation. See IPCC, *Sixth Assessment Report*, Working Group II contribution, Annex II: Glossary, 2022.

9 S. Cevik and J. T. Jalles, *An Apocalypse Foretold: Climate Shocks and Sovereign Defaults* (Washington, DC: International Monetary Fund, 2020).

10 Munich Re, "Natural Disaster Figures 2025," January 2026, accessed September 16, 2026, https://www.munichre.com/en/company/media-relations/media-information-and-corporate-news/media-information/2026/natural-disaster-figures-2025.html.

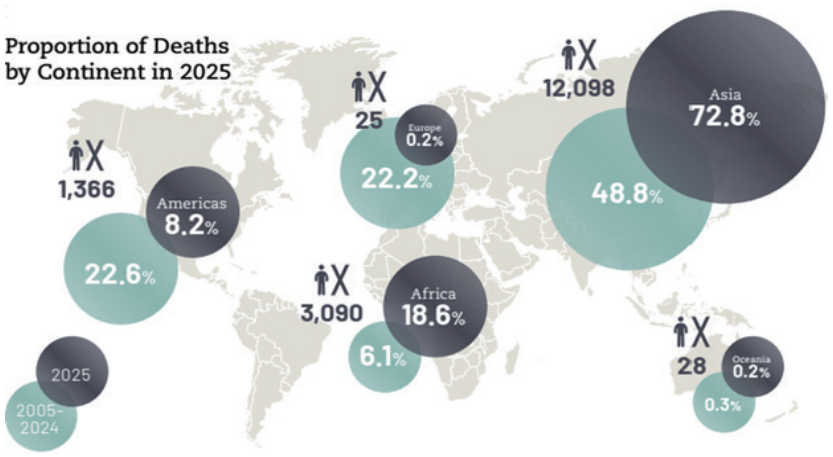


Figure 4 Share of climate-related deaths by continent, 2025

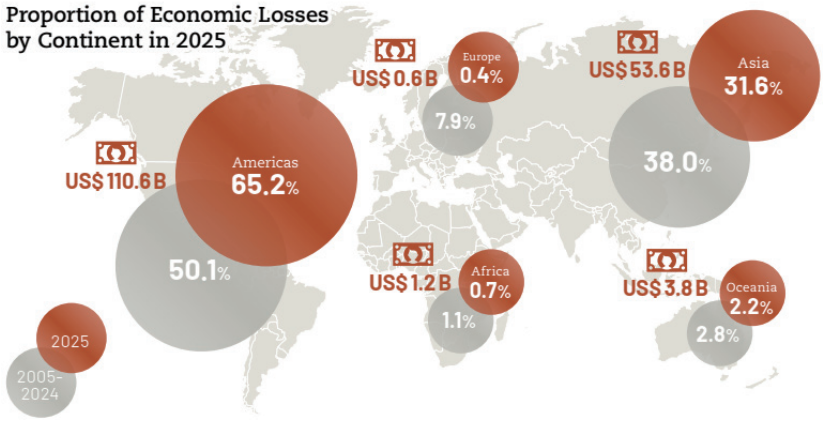


Figure 5 Share of climate-related economic losses by continent, 2025

Climate change also undermines industrial chains and the stability of foreign trade, and in turn weakens a country's appeal to foreign investors and the valuation of its assets. The Global South's pillar industries are mainly agriculture, resource extraction, and export-oriented processing and manufacturing; climate swings directly cut agricultural output, interrupt mining, and shut ports, disrupting order fulfillment and eroding export competitiveness. Brazil's soybean and mining industries are vulnerable to alternating extreme drought and rainstorm flooding; export-processing zones and manufacturing bases in southern Vietnam are frequently hit by heavy rain and urban flooding; and flooding and coastal erosion recur in Nigeria's Niger Delta oil and gas region, damaging facilities and reducing output. Supply-chain stability therefore suffers continuing disruption, and investors reassess the risk of the countries and projects involved, which affects financing costs and long-term development prospects.

(2) Disproportionate harm to vulnerable groups, triggering livelihood problems

Low-income groups, rural populations, women and children, and indigenous peoples are the most vulnerable to climate shocks and bear disaster costs far beyond their capacity to cope. Climate change reaches people's daily lives through disaster risk, loss of livelihoods, and health threats, heightening the survival pressures on vulnerable groups and, in some places, breeding social instability. In the central plains of Thailand, alternating drought and flood have sharply reduced the stability of farm livelihoods. In Indonesia's low-lying coastal zones, hundreds of thousands of residents have already been forced to relocate by sea-level rise and saltwater intrusion. In Colombia's Andean region, frequent flash floods and debris flows repeatedly damage housing, medical, and education facilities in mountain villages. Flooding in the Brazilian Amazon often displaces indigenous communities and low-income groups and brings public-health risks such as water contamination. Kenya has suffered severe droughts for several years running, sharply increasing the food-insecure population in pastoral areas and raising the risk of conflict over water and pasture. These cases show that climate adaptation is not only an engineering question but also a matter of livelihood security and social stability.

(3) Systemic infrastructure failure and large-scale depreciation of existing assets

Much of the Global South's transport, water, energy, and urban infrastructure was built to historical climate baselines without adequate regard for long-term climate trends, leaving the existing stock with very low climate resilience. Frequent extreme weather damages facilities, raises operation and maintenance costs, and shortens service life. If new infrastructure does not incorporate adaptation from the outset, whole-life operation, maintenance, and replacement costs will keep climbing, large volumes of fixed assets will be retired early, and industrialization and urbanization will be constrained for years to come. Coastal highways, ports, and sea-crossing bridges in Vietnam suffer long-term erosion from waves and storm surges, while roads in the northern mountains are regularly cut by rain-induced landslides and debris flows. In northern Chile, water and power transmission facilities serving mining areas age faster under heat and drought, driving up operation and maintenance costs. Pastoral roads and water-supply facilities in northern Kenya are often damaged by drought and wind-blown sand; in Lagos, Nigeria, severe inland flooding repeatedly damages municipal roads, drainage networks, and power facilities. Mountain roads and power transmission facilities in Kyrgyzstan face multiple risks from glacial lake outbursts, debris flows, and avalanches, while in Kazakhstan's desertified regions, highways and railways are buried by sand and undermined at the roadbed, raising maintenance frequency and costs. Once infrastructure is repeatedly damaged, it not only disrupts current services but also pushes up long-term investment costs, weakening the foundations for development.

(4) Weakening foundations of food security and rising regional famine risk

The Global South is home to the overwhelming majority of the world's smallholder farmers, who depend heavily on natural climate conditions and are directly exposed to climate change. Climate change alters temperature and precipitation patterns and intensifies pest, disease, and extreme-event risks: heat stress reduces pollination efficiency, sea-level rise causes salinization of farmland, and drought degrades pasture and cuts livestock output, delivering a broad shock to food production capacity, cropping patterns, and supply-chain stability. In the Mekong Delta, a rice-growing region of global importance, soil salinization keeps advancing northward, significantly affecting rice acreage and yields. Annual output swings in South America's main soybean regions have widened markedly and transmit directly into global food supply chains. Kenya's maize and other staple crops have declined year after year under successive droughts, raising import dependence and price volatility. Nigeria's cassava and rice belts are alternately hit by floods and seasonal drought, sharpening food-supply shortfalls. Wheat output in northern Kazakhstan's rain-fed farming areas fluctuates widely, and Saudi Arabia, constrained by extreme heat and water scarcity, relies heavily on food imports and is markedly exposed to external risks. Once food security is undermined, the effects typically spread to rural livelihoods, price stability, and social order.

(5) Water supply-demand imbalances and rising risk of transboundary water conflict

Climate change is worsening the spatial and temporal imbalance of global water resources, with drought, flooding, and deteriorating water quality occurring simultaneously; in the Global South, water supply-demand tensions and transboundary water governance challenges keep escalating. Glacier melt and shifting precipitation are reshaping water availability: in the short term, excess glacial meltwater causes flooding in the wet season; over the long term, glacier depletion sharply reduces river base flow. Groundwater is heavily over-extracted in dry regions, and aquifers continue to be depleted; seawater intrusion contaminates freshwater sources along the coast; and the uneven distribution of precipitation and runoff along transboundary rivers sharpens disputes between upstream and downstream states. United Nations agencies project that by 2030 large numbers of people in the Global South will face severe water stress; transboundary water cooperation has therefore become a central issue of regional governance. In Southeast Asia, rainfall is unevenly distributed in space and time, dry-season supply falls short, and seawater intrusion degrades coastal groundwater quality. Mekong basin countries face longer dry seasons and worse wet-season flooding as monsoon rainfall and upstream flows fluctuate, raising the pressure on basin regulation and flood-control coordination. In Chile, accelerating glacier melt and declining river runoff have made water scarcity the central bottleneck of national development; major cities such as Cape Town in South Africa have at times approached the limits of supply after successive drought years. The water crisis in the Aral Sea basin of Central Asia keeps deepening: more volatile glacial meltwater upstream and widening gaps in irrigation and ecological water downstream make coordinated transboundary governance ever more urgent. Gulf states depend mainly on desalination for freshwater, a

costly and energy-intensive source; under extreme heat, water demand keeps rising, and supply and demand have long been out of balance. Water problems often cross borders; without coordinated governance, resource scarcity can escalate into regional conflict.

2.3 Climate Adaptation as a Key Lever for Green Development in the Global South

Climate change sends a systemic, cross-sectoral shock through economic growth, livelihoods, infrastructure, food security, and water resources, and most of these impacts are locked in and irreversible; development that does not take adaptation into account cannot be sustained. Green and low-carbon assets are themselves long-term investments: infrastructure built to historical climate standards can be destroyed outright by a single major disaster, and decades of transition investment would be hard to recover. To neglect adaptation is to leave the gains of the transition exposed to climate risk.[11]

Adaptation and mitigation are mutually reinforcing in most domains. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) finds that the synergies between near-term adaptation and mitigation action and the Sustainable Development Goals outweigh the trade-offs. Nature-based solutions are a prime vehicle for that synergy: mangroves, coastal wetlands, and forests reduce storm-surge and flood risk and support fishing livelihoods while also forming carbon sinks; climate-smart agriculture strengthens drought and flood resilience while cutting agricultural emissions; and urban green space and sponge-city infrastructure cool and drain cities while lowering building energy use. Embedding adaptation and mitigation together in the development process is therefore a green development pathway that serves both climate goals and the Sustainable Development Goals. For the Global South, adaptation is not an additional burden outside green development but the precondition for the transition to proceed and for development gains to be secured. The earlier adaptation is embedded in development planning, investment decisions, and engineering standards, the lower the total cost of the transition and the more solid the foundation for green development.[12]

11 IPCC, *Climate Change 2022*.

12 IPCC, *Climate Change 2023*.

3. Structural Roots of Climate Vulnerability in the Global South

The Global South's high climate vulnerability is not determined by physical geography alone. It is the product of three underlying factors that compound one another: the constraints of its development stage, weak infrastructure, and inadequate governance capacity. These three factors are intertwined and form the core of climate vulnerability: lagging development limits both infrastructure investment and governance capacity; weak infrastructure magnifies the damage caused by climate disasters; and inadequate governance prevents even limited resources from being allocated effectively. Cutting across all three is the shortage of finance, which, given the scale of the gap and the complexity of its causes, is examined separately in section 4. Overall, climate vulnerability in the Global South is not the product of any single risk but the concentrated expression of structural tensions in the development process when climate shocks hit.

3.1 Lagging Development: Late Start in Industrialization and Urbanization, Competing Goals

The Global South generally faces the dual predicament of insufficient development and difficult transition. Most countries are still at an early stage of industrialization, with urbanization accelerating. Their economies depend heavily on resource extraction, energy-intensive basic industries, and exports of primary products, leaving them relatively marginal in the global division of labor and short of core technologies and innovation capacity. On the one hand, these countries must expand energy, industrial, and infrastructure capacity to create jobs and growth, and they have a legitimate need for emissions space for development. On the other, limited fiscal capacity makes it hard to fund climate adaptation in step, leaving countries caught between the three objectives of development, mitigation, and adaptation.

Within these multiple constraints of lagging development, the shortage of finance is especially acute: heavy debt burdens and squeezed fiscal space form the core of the development dilemma. The United Nations' Financing for Sustainable Development Report 2024 puts the annual financing gap for the Sustainable Development Goals (SDGs) in developing countries at about US$4 trillion, with the green and low-carbon transition financing gap accounting for more than 60%. Many countries now spend more on debt interest than on health or education. High interest rates in developed economies, compounded by the depreciation of developing countries' currencies, have further raised the cost of external debt, leaving the Global South in a reactive position in climate action. Overall income levels across the Global South are also low; social resources go first to basic subsistence, and climate resilience has long been relegated to second place.[13]

13 United Nations, Financing for Sustainable Development Report 2024 (New York: United Nations, 2024).

The Global South also faces structural constraints arising from the technology divide and insufficient digital capacity. Developed countries' monopoly over digital technology and their restrictions on access to it, together with their command of the rules of the digital economy and digital trade, limit the Global South's ability to raise its digital competitiveness. The region's participation in high-end manufacturing and emerging technology industries remains limited overall. The green transition experience of developed countries cannot simply be replicated in Global South countries whose development foundations differ greatly. Early warning systems, climate risk assessment tools, water-saving irrigation, and stress-tolerant crop varieties, for example, all require a certain level of technical capacity and data infrastructure, and most Global South countries still have clear shortcomings in these areas.

3.2 Weak Infrastructure: Insufficient Resilience of Existing Assets, Missing Adaptation Standards for New Projects

Weak infrastructure is the most direct amplifier of climate vulnerability in the Global South. The infrastructure still to be built worldwide is concentrated mainly in developing countries, placing the Global South at a critical juncture in its large-scale infrastructure expansion. Infrastructure is long-lived, capital-intensive, and immovable; once built, retrofitting it costs far more than incorporating climate resilience requirements at the design stage. Whether today's new projects take climate risk into account will therefore determine, to a large extent, the safety and service capacity of assets for decades to come. If adaptation standards are not embedded from the outset, losses running into trillions of dollars lie ahead.

Much existing infrastructure was designed to historical climate baselines with insufficient regard for long-term climate trends, leaving it generally low in climate resilience. Coastal infrastructure is increasingly exposed to sea-level rise, erosion, and saltwater intrusion, which can reduce structural strength, accelerate corrosion, and cause repeated service interruptions. The problem is especially acute in cities. Urban areas across the Global South face rapid expansion, spreading informal settlements, and constrained fiscal and institutional capacity; many have aging drainage systems and low flood-protection standards, so extreme rainfall quickly causes urban flooding. Some ports, highways, power stations, and water-supply facilities also lack the capacity to cope with compound hazards such as storm surges, extreme heat, and drought. Insufficient resilience in the existing stock means that even without new investment, existing assets face ever-higher disaster losses and operation and maintenance costs, eroding development gains over time.

Because of funding shortages and short-term incentives, most new projects in Global South countries have yet to undergo climate risk assessment, so climate risk will keep accumulating in newly built assets. Resilient infrastructure may cost more up front, but it delivers higher returns over the asset's life. The World Bank estimates that low- and middle-income countries face an infrastructure financing gap of US$1.5 trillion a year. Sub-Saharan Africa alone needs US$93 billion a year in infrastructure investment,

and the African Development Bank puts Africa's annual infrastructure financing gap as high as US$170 billion across energy, transport, water, digital, and logistics. In India, urban infrastructure investment is only 0.7% of GDP, less than half of what is needed. Operation and maintenance funding in the Global South is also clearly inadequate: existing water, levee, and drainage facilities fall into disrepair year after year, and their disaster resistance continues to weaken.[14] [15]

3.3 Inadequate Governance Capacity: Adaptation Plans Hard to Deliver, Risk Baselines Unclear

Inadequate governance capacity is another pronounced difficulty for climate adaptation in the Global South. Constrained by development stage, resource endowment, and institutional systems, the region's climate governance capacity is generally weak, and in most countries national adaptation plans struggle to move from high-level design to concrete results. Adaptation policy is spread across multiple agencies without a standing coordination mechanism; local implementation capacity is weak, with funding and staff slow to materialize; and projects are insufficiently prepared to meet the requirements of international funding applications. Policy delivery therefore often falls short of what the plans promise.

At the same time, meteorological and hydrological monitoring stations are sparse across large underdeveloped areas, early warning systems and climate risk assessment mechanisms lag behind, and unclear risk baselines in turn limit the precision of policymaking. Many countries lack long time series of climate and disaster data, making it hard to assess risk accurately across regions and sectors, and therefore hard to direct limited resources to where they are most needed. Channels for passing early warning information down to communities and farmers are also inadequate, so it is difficult to organize evacuation and relocation effectively before a disaster strikes. Changing this requires advancing governance reform, basic capacity building, and South-South coordination mechanisms in parallel, systematically strengthening climate governance capacity within the development process, so that stronger governance can underpin the green transition and climate resilience.

14 World Bank, "Sustainable Infrastructure Finance," accessed September 16, 2026, https://www.worldbank.org/en/topic/sustainableinfrastructurefinance.

15 African Development Bank, "Africa's Infrastructure Needs and Financing Gap," accessed September 16, 2026, https://www.afdb.org.

4. Inadequate Finance as a Key Constraint on Green and Resilient Development in the Global South

Inadequate finance is the greatest obstacle to climate adaptation in the Global South today. The funding shortage is at once the underlying economic reason the three difficulties of lagging development, weak infrastructure, and inadequate governance capacity have proved so persistent, and the source of the systemic problems in the global adaptation finance system: steadily expanding needs, insufficient total supply, skewed allocation, and weak delivery on the ground. The direct result is that national adaptation plans stall and resilience improves only slowly. At root, the adaptation finance gap is not simply a financing problem; it is the product of how responsibilities are allocated, how finance rules are written, and how development stages differ within the global climate governance system.

4.1 The Overall Scale of the Global Adaptation Finance Gap

UNEP's Adaptation Gap Report 2025 estimates that developing countries will need US$310–365 billion a year for adaptation by 2035 (in constant 2023 dollars; the lower bound is a model estimate, the upper bound extrapolated from needs stated in countries' nationally determined contributions (NDCs) and National Adaptation Plans (NAPs)), and the figure will climb further in nominal terms if inflation follows its past-decade trend. Yet international public adaptation finance flowing to developing countries was only about US$26 billion in 2023, leaving an annual gap of US$284–339 billion, with needs running 12 to 14 times current flows. The trend is also adverse: flows of about US$28 billion in 2022 fell to US$26 billion in 2023, so shrinking supply and accelerating demand are pulling further apart. Adaptation finance from multilateral development banks grew 31% in 2025 to US$35 billion, approaching their collective 2030 target of US$42 billion but still far short of developing countries' adaptation needs of hundreds of billions a year.

Viewed through the broader lens of climate finance, the Climate Policy Initiative (CPI) estimates that global annual climate finance needs will reach at least US$6.2 trillion by 2035 (mitigation and adaptation combined), with the adaptation gap set to keep widening. By contrast, the developed countries' pledge of US$100 billion a year in climate finance was declared met for the first time only in 2022, and both the accounting basis and the actual volume delivered remain disputed among Global South countries; the funding is mainly loans with limited concessionality, further squeezing the space for adaptation finance in the Global South. This shows plainly that the adaptation finance gap is not merely a matter of volume: it is closely tied to the quality of finance, its concessionality, and how it is allocated.[16] [17]

16 Climate Policy Initiative, *Global Landscape of Climate Finance 2026* (London: Climate Policy Initiative, 2026).

17 Organisation for Economic Co-operation and Development, *Climate Finance Provided and Mobilised by Developed Countries in 2013–2024* (Paris: OECD, 2026).

The gap is pronounced in every region. In Africa, Kenya's adaptation needs exceed US$40 billion while it actually receives about US$0.5 billion, an 80-fold gap. In South America, the annual adaptation finance gap for Latin America and the Caribbean is projected at about US$47 billion by 2035, and the Green Climate Fund's allocation share to the region is far below that to sub-Saharan Africa. In Central Asia, on CPI's estimate for "Central and West Asia," annual needs are US$15 billion against only about US$1 billion available, a gap of 93%; between 2013 and 2018, only 19% of the region's international public climate finance went to adaptation, and 89% was provided as debt instruments. In the Middle East, Morocco, Tunisia, Jordan, and other countries have received support through channels including the Green Climate Fund (GCF), though this falls far short of investment needs, and Iraq's financing is limited by economic and governance constraints. In East Asia and the Pacific, finance needs are the highest of any developing-country region, at US$141 billion. South Asian countries and small island states are broadly constrained by access barriers: high application thresholds, long approval cycles, and low grant shares.

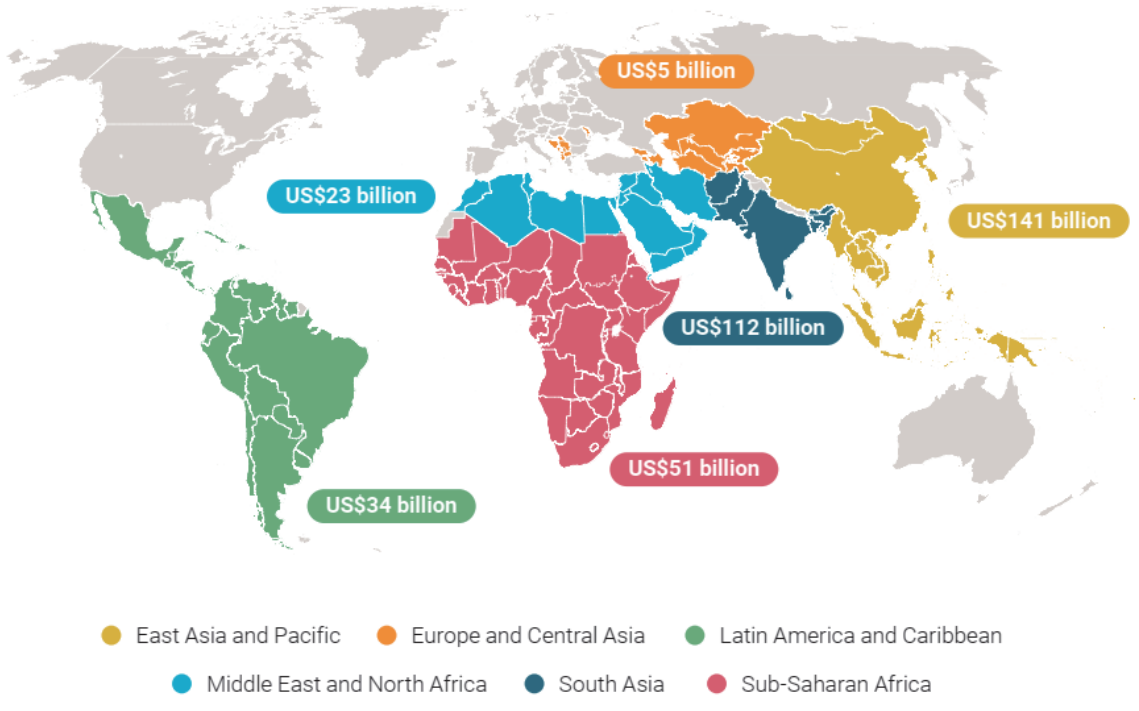


Figure 6 Adaptation finance needs of developing countries, by region
(US dollars, 2023 prices; non-Annex I parties listed by region only)

4.2 Structural Causes of the Finance Gap

The adaptation finance gap is not a failure at any single point but the combined outcome of how the global climate finance system performs on three levels: supply, allocation, and risk sharing. On supply, the problem is insufficient volume and structural imbalance; on allocation, finance struggles to reach the most vulnerable countries and sectors; on risk sharing, institutional arrangements are weak and market-based instruments are largely absent. The three reinforce one another, which is why the gap has proved so difficult to close.

First, total supply is insufficient and structurally imbalanced: there is not enough money, and it does not go where it is most needed. International public climate finance amounted to roughly US$83 billion in 2023, of which only about 31% went to adaptation, far below the goal of balance between mitigation and adaptation. In 2024, global climate finance crossed US$2 trillion for the first time, yet only about US$64 billion, roughly 3%, went to adaptation, and adaptation flows have stagnated since 2023, with supply growing far more slowly than risk. The structure of finance also does not suit the character of adaptation. The current system favors projects with clear economic returns, while areas with strong public-good characteristics and limited commercial returns, such as agricultural resilience, ecosystem protection, community adaptation, and early warning, struggle to attract private capital. UNEP estimates that the private sector could provide at most about US$50 billion a year for adaptation, against actual investment of only about US$5 billion, so the potential remains largely untapped. Although the Governing Instrument of the Green Climate Fund calls for a 50:50 balance between mitigation and adaptation, actual allocations still skew heavily toward mitigation. Adaptation finance is therefore both insufficient in total and clearly misallocated.[18] [19] [20] [21]

4.3 Assessing the COP30 Adaptation Finance Goal

At COP30 in Belém in November 2025, parties reaffirmed the goal of doubling adaptation finance from 2019 levels by 2025 (baseline US$18.8 billion, target US$40 billion) and "called on" parties to at least triple adaptation finance by 2035 (the decision text sets no specific figure; the roughly US$120 billion a year is extrapolated from the Glasgow US$40 billion target), while pushing to mobilize US$1.3 trillion a year for climate action by 2035. Measured against actual needs, however, the goal falls clearly short. First, the scale is severely insufficient: even if the US$120 billion is delivered on schedule, a gap of US$190–245 billion would remain against the annual needs described above, covering only 33–39% of them, or 23–27% once inflation is taken into account. The COP30 goal is a positive signal, but it remains far short of the Global South's actual adaptation needs.

18 UNEP, *Adaptation Gap Report 2025.*

19 UNEP, *Adaptation Gap Report 2025.*

20 Green Climate Fund, "Governing Documents," accessed September 23, 2026, https://www.greenclimate.fund.

21 Munich Re, "Natural Disaster Figures 2025."

Second, the goal lacks binding force. The decision uses "calls on" rather than "decides" and is not legally binding. History counsels caution: the US$100 billion goal was met only after a two-year delay and its attainment is still widely questioned, and the doubling goal has also been poorly implemented. The report cited above concludes that on current trends the goal of doubling to about US$40 billion by 2025 will not be met, and whether the tripling goal can be achieved is highly uncertain. Third, the decision does not address the quality and structure of finance: it sets no requirement for grant shares, concessional terms, or a tilt toward least developed countries, so even if totals rise, accessibility problems for the most vulnerable countries and sectors will persist as long as funds remain loan-heavy and concentrated in large projects. Finally, the goal is not coordinated with supporting elements such as technology transfer and capacity building; more money without accompanying capacity building constrains how efficiently it can be used. The COP30 goal is a positive signal, but its scale, binding force, and structural design are all inadequate for the Global South's worsening adaptation finance gap. The Global South must keep pressing for higher-level commitments and a fairer allocation structure while expanding diversified financing channels.[22]



22 United Nations Framework Convention on Climate Change (UNFCCC), Global Mutirão: Uniting Humanity in a Global Mobilization Against Climate Change (Belém: UNFCCC Secretariat, 2025).

5. The Multiple Benefits of Climate Adaptation Action

For a long time, climate economics concentrated on the medium- and long-term returns to emissions reduction, and the wider value of adaptation was never fully assessed. Most international assessments measure only direct losses, overlooking the industrial, livelihood, and ecological gains that adaptation generates. Adaptation has consequently been treated as a pure cost, which is one reason it has struggled to attract finance. This misperception is a major cause of the persistent shortfall in adaptation funding.

The Triple Dividend of Resilience framework divides the returns to adaptation and resilience investment into three cumulative layers: avoided losses, economic development, and social and environmental benefits. The framework originates in the resilience investment appraisal system of the World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR) and is now widely used to evaluate adaptation benefits. It moves beyond a cost-benefit approach concerned only with avoided losses: avoided losses are the near-term, direct return; economic development is the medium-term industrial gain; and social and environmental benefits are the long-term public return. The three reinforce one another, since fiscal space released by avoided losses can be redirected to productive investment, growth can be ploughed back into livelihoods and ecosystems, and better social and ecological conditions in turn reduce long-term disaster losses.

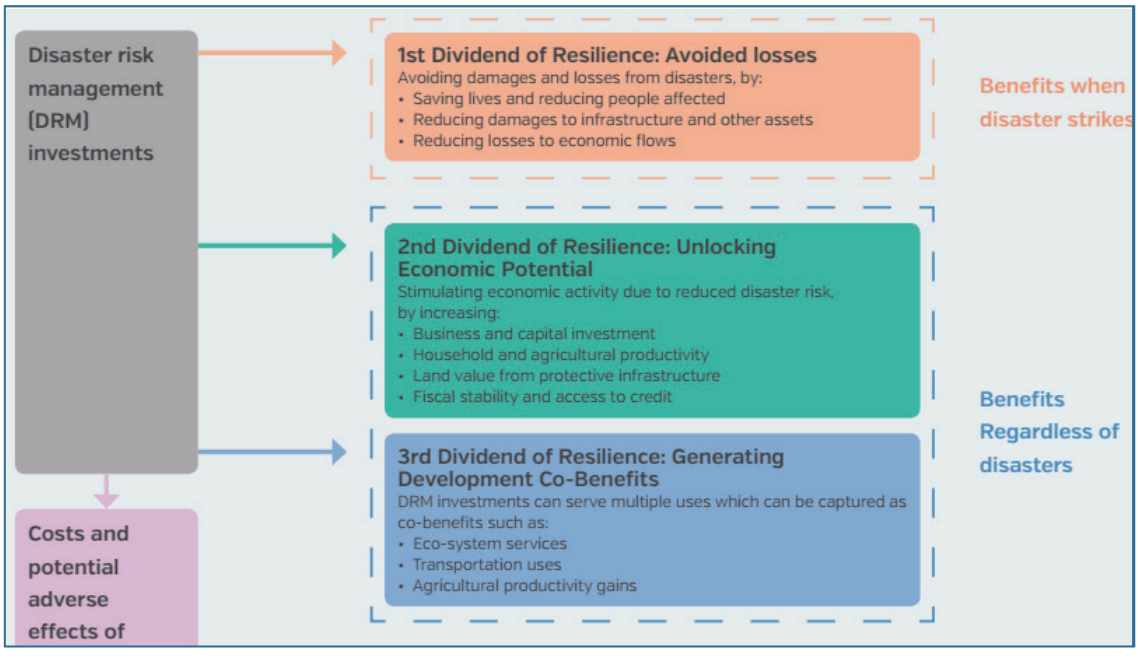


Figure 7 Theoretical framework of the climate adaptation "triple dividend"

5.1 The First Dividend: Avoided Losses from Adaptation Action

Avoided losses are the most direct and most readily observed return on adaptation. The mechanism is straightforward: placing engineering, policy, and early warning systems upstream raises climate resilience, narrows the scope of destruction, reduces direct economic losses and output losses, and avoids the large fiscal outlays of post-disaster reconstruction. It is, in essence, a saving on risk costs. Compared with the other two dividends, these returns materialize fastest; most water conservancy, levee, and meteorological early warning projects begin delivering avoided losses as soon as they enter service.

The burden of disaster losses falls very unevenly across income groups. The least developed countries account for about 1% of global economic output but absorb more than 10% of reported global disaster losses. On returns, the World Bank and GFDRR, in Lifelines: The Resilient Infrastructure Opportunity, estimate that resilient infrastructure investment in low- and middle-income countries yields average net benefits of US$4.2 trillion, or US$4 for every dollar invested. A 2026 International Finance Corporation study finds that targeted resilience investment in emerging-market infrastructure assets can protect up to US$8.60 of asset value per dollar invested.

Adaptation is front-loaded in cost and back-loaded in savings. A one-off construction outlay delivers disaster prevention benefits that persist for decades and prevents relief and reconstruction spending from repeatedly crowding out budgets for education, health, and industrial development. UNDRR data show that every dollar spent on disaster risk prevention avoids an average of US$15 in post-disaster recovery costs. Yet 88% of disaster management funding from humanitarian, development, and government sources currently goes to post-disaster response and only 4% to prevention, mitigation, and preparedness, leaving public budgets to carry the burden of reconstruction year after year.

Early warning is among the most effective measures for avoiding losses. A November 2025 assessment by UNDRR and WMO found that 119 countries have multi-hazard early warning systems, but coverage is only 43% in small island developing states, and only four in ten African countries have comparable capacity. Issuing a storm or heatwave warning 24 hours in advance can reduce disaster losses by about 30%.

5.2 The Second Dividend: Economic Development Benefits of Adaptation Action

Adaptation does not only reduce losses; it also creates additional value. Large-scale adaptation investment generates new demand directly: the Global Commission on Adaptation estimated that US$1.8 trillion invested between 2020 and 2030 in five areas, namely early warning systems, climate-resilient infrastructure, improved dryland agriculture, mangrove protection, and water resource resilience, would yield US$7.1 trillion in net benefits. A Standard Chartered report, The Adaptation Economy, estimates adaptation investment needs in ten major developing markets at no less than US$317.4 billion by 2040, rising to US$1.4 trillion by 2050. This demand is concentrated in resilient water infrastructure, coastal

protection, water-saving agriculture, and stress-tolerant breeding, and it pulls in local building materials, construction, and equipment manufacturing, giving the Global South room to upgrade its industries while it adapts.

Adaptation investment also creates employment throughout the project cycle: construction absorbs local labor for building and surveying, while operation generates long-term jobs in water management, ecological restoration, meteorological monitoring, and facility maintenance. A 2024 joint assessment by the ILO, UNEP, and IUCN found that more than 60 million people already work in nature-based solutions, mostly in developing countries in Asia and the Pacific; with sustained investment, up to 32 million additional jobs could be created by 2030, with the largest gains in Africa, Latin America, and the Middle East.

Climate resilience also translates into asset value in financial markets. A 2025 estimate by SOAS University of London finds that countries with high climate vulnerability pay about 1.2 percentage points more on sovereign borrowing, and that the 40 members of the Climate Vulnerable Forum paid roughly US$62 billion in additional interest between 2007 and 2016; investment in adaptation and resilience helps lower these costs. In capital markets, the European Bank for Reconstruction and Development issued the world's first dedicated climate resilience bond in 2019, and the Climate Bonds Initiative published its Climate Resilience Principles the same year, bringing resilience into green bond standards. Multilateral development banks and international green funds can provide cheaper, longer-tenor finance for resilience projects.

5.3 The Third Dividend: Social and Environmental Benefits

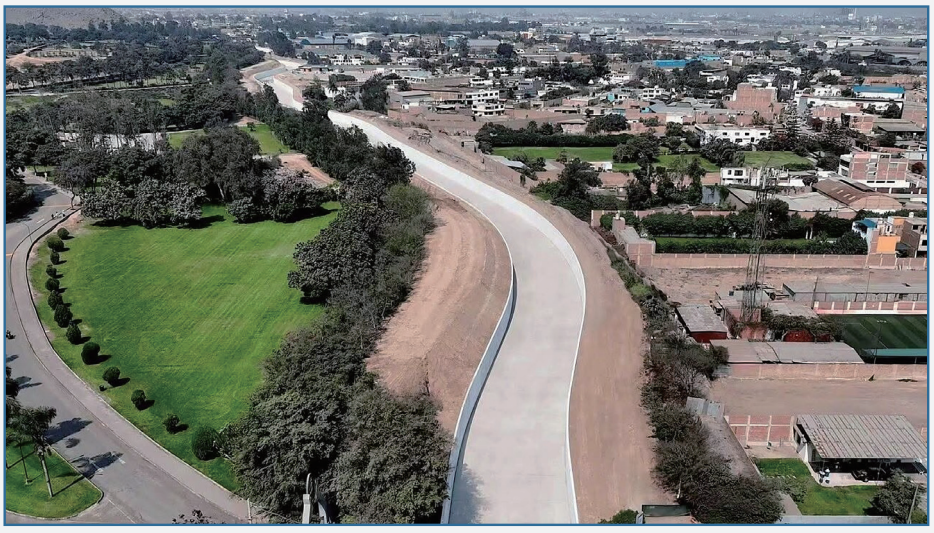
Adaptation works directly safeguard the basic needs of the poorest. Flood control reduces casualties in villages and towns, water-saving irrigation stabilizes smallholder output, urban and rural water supply secures drinking water during heatwaves and droughts, and community-level early warning networks buy time for evacuation. Together they form a basic livelihood safety net. Stable access to food, water, and housing curbs the slide back into poverty after disasters and eases the social tensions that climate migration can create, supporting the 2030 Agenda goals of no poverty and good health and well-being.

Most adaptation works use nature-based solutions that combine disaster prevention with ecological restoration at lower cost and with more durable ecological benefits. Mangrove belts replace hard sea walls, resisting storm surges while sustaining coastal wetlands; watershed conservation and planted forests curb desertification and restore habitats; green roofs and vertical greening sequester carbon while cutting building energy use. Adaptation finance and projects also tilt toward poorer inland, border, and rural areas, helping close gaps in water infrastructure, disaster prevention, and water supply and narrowing urban-rural and regional disparities in public services. Transboundary adaptation projects can further align upstream and downstream countries around shared management, supporting more balanced regional development.

Case Analysis of the Multiple Climate Adaptation Benefits of Green Infrastructure

Case: The Comprehensive Improvement Project on the Huaycoloro River, Peru

The Huaycoloro River rises in the Andes and flows downstream through the Lurigancho-Chosica district on the eastern edge of Lima, Peru's capital, where more than 30,000 families live along its banks. The great floods triggered by the 2017 El Niño inundated communities such as Santa María; the channel was blocked with sediment and rock, floodwaters lingered, and the ordeal left painful memories. Peru subsequently established the Authority for Reconstruction with Changes to drive a comprehensive reconstruction and reform program. In May 2022, China Water and Electric Foreign Co., Ltd. (China Communications Construction Company) won the bid and began construction, and the project was successfully completed in September 2025. Stretching 10.6 kilometers, the works include bank protection, aqueducts crossing the river, Bailey bridges, and riverside parks.



Aerial view of the comprehensive improvement project on the Huaycoloro River, Peru

Avoided-losses dividend: After hardening the channel, the project built 4.5-meter concrete walls along both sides of the 15.6-meter-wide riverbed, forming a solid defense, and a chute-like design inside the bed markedly increases flood conveyance capacity. Decades of flood threats to river-side communities have been substantially eased, making the project a landmark of disaster prevention and mitigation in the area.

Economic development dividend: While comprehensively improving the river channel, the project also laid a solid foundation for bridge construction. Once the two new bridges entered service, they cut travel time, improved connectivity between districts, secured the safe movement of people and goods, and promoted more balanced coverage of public services such as education, with direct and positive effects on local economic and social development. The Leticia riverside park built alongside the channel has become a new recreation space for residents. The sustainable appreciation of the infrastructure is evident.

Social and environmental dividend: As the project proceeded, the river environment improved markedly, and strict control of sewage discharges along the banks significantly improved water quality. The project achieved its core goals of flood control and disaster reduction while simultaneously raising environmental quality, improving living conditions, and strengthening community cohesion.



Hoisting of the first Bailey bridge structure of the Huaycoloro River comprehensive improvement project begins

The Huaycoloro project fully validates the triple dividend of green infrastructure adaptation: systematic flood-control works resolved the flooding that had long threatened lives and property (avoided losses); the bridges and supporting works boosted the local economy and eased commerce and public services (economic development); and channel management and ecological restoration improved the community environment and ecological quality (social and environmental). A single green infrastructure adaptation project releases all three dividends at once, with aggregate returns far beyond those of a pure disaster-prevention scheme.

Case Analysis of the Multiple Climate Adaptation Benefits of Green Transport

Case: Phase I of the Astana Light Rail Transit project, Kazakhstan

Astana is the world's second coldest capital, with winter lows reaching –40°C and less than six months of effective construction time a year. In May 2026, Phase I of the Astana LRT, a flagship Belt and Road project jointly built by China and Kazakhstan, opened to traffic. The 22.4-kilometer line has 18 stations and was built entirely with Chinese technology, standards, and equipment, integrating key technologies such as fully automatic driverless operation, contact-rail power supply, and "extreme cold adaptation." It is the first urban light rail in Central Asia and a representative example of the systematic export of China's urban light rail construction system. During construction, the Chinese contractors fulfilled their social responsibilities, hiring local workers, providing more than 2,000 jobs, and holding over 100 technical training sessions.



Phase I of the Astana Light Rail Transit project, Kazakhstan[23]

Avoided-losses dividend: Astana's extreme cold places exceptional demands on LRT materials, workmanship, and equipment. The project team made systematic adaptation designs for the extreme cold: adjusting and optimizing construction organization, improving winter work safeguards, and strictly controlling concrete curing and process quality at low temperatures, overcoming the difficulties of rail transit construction in severe cold. The integrated extreme-cold adaptation technologies ensure the safe, stable operation of the line at –40°C. This systematic climate adaptation design sharply reduces the risks of equipment failure, service interruption, and accidents caused by extreme low temperatures, avoiding direct economic losses and indirect social costs from weather-related shutdowns. With the line open, its uninterrupted year-round operation frees the city's public transport system from the periodic constraints that extreme cold imposes on travel.

23 Photo: Chinanews.com.

Economic development dividend: The LRT has energized economic activity and raised land values along the line, providing efficient, reliable north-south commuting and effectively advancing regional economic integration. During construction, green and smart methods such as building information modeling, intelligent welding robots, and prefabricated construction drove the development of local building materials, construction, and technical services, accumulating technical experience and talent for future transport infrastructure across Central Asia. The key technologies adopted, such as extreme-cold adaptation and fully automatic driverless systems, lay a practical foundation for exporting regional green transport infrastructure standards. The project team completed construction efficiently within a limited window, and its management model and cold-region construction experience offer direct lessons for other Central Asian countries facing similar climatic challenges.



Phase I of the Astana Light Rail Transit project in operation[24]

The Astana LRT fully validates the triple dividend of green transport adaptation: systematic adaptation to extreme cold secures safe, stable operation under severe climates (avoided losses); green and smart construction technologies and experience drive local industrial chains and the export of technical standards (economic development); and clean, efficient public transport improves the urban environment and the travel experience (social and environmental). The project shows that climate resilience, economic returns, and social well-being can be advanced together, providing a replicable and adaptable "Chinese solution" for urban rail transit in cold regions.

24 Photo: Chinanews.com.

5.4 Conditions, Constraints, and Limits on Realizing the "Triple Dividend"

The three dividends are not equally measurable. Avoided losses appear only when a disaster occurs and are contingent returns based on scenario assumptions, so they must be estimated through probabilistic risk assessment. The evidence for the economic development dividend is the weakest: how reduced risk translates into investment and economic activity is the largest gap in the literature. Social and environmental dividends involve non-market values such as ecosystems, health, and equity, for which no common monetization method exists. Benefit-cost ratios are therefore estimates of a potential range, not precise accounting of returns. The framework also assumes that adaptation measures work and that dividends materialize as expected; it does not screen for maladaptation and has no built-in distributional lens. It is best treated as a reference tool for project appraisal and policy communication.

Whether the dividends materialize depends on the institutional environment. The IPCC assesses that soft limits to adaptation arise mainly from finance, governance, institutional, and policy constraints, which can be overcome by putting enabling conditions in place: stable policy expectations and cross-sectoral coordination, transparent fiscal disbursement and project management, effective land tenure and market institutions, and accessible climate risk information and technical services. Where governance is weak, protective works can produce a levee effect that draws excessive development into high-risk areas. Distribution and participation also determine who benefits: research in Ghana documents cases in which, after coastal protection was built, developers took over the newly valuable shoreline and residents were displaced, so aggregate benefits did not improve local livelihoods.

Financing arrangements are the most direct determinant. Adaptation projects are mostly public-sector led, and the avoided-loss and social and environmental returns do not generate the cash flows needed to service debt, so commercial capital is reluctant to take part; financing at market rates raises the cost of capital and depresses the benefit-cost ratio. International public finance such as grants and concessional loans can fill the gap and provide patient capital matched to the pace at which dividends emerge.

Multiple international assessments indicate that benefit-cost ratios for resilience investment generally range from 2:1 to 10:1, and are likely higher for early warning and ecosystem-based projects. With the warming trend hard to reverse in the short term and disaster risk still rising, delaying adaptation only accumulates risk and magnifies future losses; laying out adaptation in advance remains the rational choice, locking in long-term returns at a low upfront cost.



6. A Region-by-Region Assessment of Climate Adaptation in the Global South

This report assesses nine regions: Southeast Asia, South America, Africa, Central Asia, the Middle East, East Asia, South Asia, the Pacific small island states, and Central America and the Caribbean. The grouping reflects geographical proximity and the relative consistency of climate risk characteristics. Within a region, countries share broadly similar leading hazards and vulnerable systems, which makes it possible to distill common features; across regions, hazard types, economic structures, and adaptive capacity differ markedly, calling for tailored responses. A common framework is applied throughout: starting from the basic features of regional development, it assesses climate trends, impacts, and risks, reviews progress on adaptation policy and action, and identifies priority areas and key constraints. The assessment draws on reports by UNEP and other international organizations, official documents such as nationally determined contributions and national adaptation plans, and regional research.

Globally, as of mid-2026, 172 countries have formulated national adaptation policies, strategies, or plans, and 77 developing countries have formally submitted National Adaptation Plans to the United Nations Framework Convention on Climate Change (UNFCCC). National Adaptation Plans are becoming the roadmap by which countries build climate resilience and steer investment in key sectors such as water, food, health, infrastructure, and ecosystems; yet the depth of policy, the choice of priorities, and the key constraints differ sharply across regions, calling for tailored responses grounded in common features.

Table 2 Climate risks and adaptation priorities in major regions of the Global South

Region	Leading hazards	Most vulnerable systems	Adaptation priorities	Key constraints
Southeast Asia	River floods, urban waterlogging, drought, tropical cyclones, sea-level rise	Water and food security, coastal cities, public health	Coastal infrastructure resilience, urban flood control and drainage, compound risk monitoring and warning	Insufficient island-coast-basin monitoring, weak transboundary basin and ocean coordination, gaps in water-food-coastal infrastructure
South America	Abrupt drought-flood swings, glacier retreat, Amazon degradation, floods and landslides, sea-level rise	Andean water towers, export agriculture, coastal cities	Ecosystem-based adaptation, agricultural adaptation, water resources adaptation	Weak coordinated governance, thin observation and risk data, immature measurement and financing mechanisms
Africa	Drought, floods, tropical cyclones, sea-level rise	Rain-fed agriculture, food security, pastoral livelihoods	Food security, grassroots meteorological warning, rain-fed agricultural resilience	Observation and warning shortfalls, weak grassroots governance transmission, unmet agricultural infrastructure needs
Central Asia	Warming, glacier melt, spring floods and summer water shortages, desertification, saline dust	Transboundary water-food-energy, high-mountain ecosystems, agriculture and pastoralism	Transboundary water security, glacier monitoring and protection, climate-resilient agriculture and ecological livelihoods	Tight water-energy coupling, fragile glaciers and high-mountain ecosystems, compounding water constraints and land degradation
Middle East	Extreme heat, drought, flash floods, sea-level rise, seawater intrusion	Water resources, urban heat environment, agriculture and food	Protection of settlements under extreme heat, engineered water security, urban climate resilience	Overreliance on engineered water supply, low recovery thresholds of arid ecosystems, lagging urban heat governance
East Asia	Sea-level rise, typhoon storm surges, extreme rainfall, heatwaves, drought, desertification, cryosphere degradation	Coastal megacity clusters, water and food security, pastoral livelihoods	Resilience of coastal megacity clusters, heat-health and labor protection, water security and drought risk management, grassland restoration and desertification control	Large adaptation investment needs against limited fiscal space, weak alignment between retrofit and new-build resilience standards
South Asia	Rainstorms and floods, extreme heat, glacial lake outburst floods, coastal storm surges	High-mountain cryosphere, agriculture and water resources, low-lying delta coasts	High-mountain cryosphere monitoring and transboundary disaster prevention, agricultural resilience and water management, compound risk protection in deltas and coastal areas	Insufficient high-mountain hazard monitoring and warning, weak transboundary river coordination
Pacific Small Island States	Sea-level rise, marine heatwaves, tropical cyclones	Coastal living space, freshwater and food security	Coastal and freshwater security, climate-resilient fisheries and food systems, early warning	Limited capacity to access international climate finance, thin observation networks and data
Central America and the Caribbean	Sea-level rise, hurricanes, marine ecosystem degradation	Housing and infrastructure, marine and coastal ecosystems	Disaster-proofing of critical infrastructure and housing, protection of marine and coastal ecosystems	High debt and insufficient concessional finance, limited observational and data capacity, combined brain drain and ecosystem degradation

6.1 Southeast Asia

Southeast Asia combines continental, peninsular, and archipelagic geography. Population, cities, ports, and manufacturing are concentrated along riverbanks, deltas, and low-lying coasts, and this spatial concentration magnifies exposure. The main problem for regional water security is not total water shortage but rainfall concentrated in the wet season with large year-to-year swings, so drought and flood alternate and compound with seawater intrusion; and with dense shipping lanes, transboundary rivers, and regional supply chains, climate risk travels easily along river basins and industrial chains.

The region is experiencing sustained warming, more volatile rainfall, and rising seas: Malaysia's average surface temperature has risen by about 0.2°C per decade over the past 50 years, and sea level at Vietnam's coastal stations is rising 2.74 mm a year. The leading hazards are river floods, urban waterlogging, heat and drought, tropical cyclones, landslides, and seawater intrusion: the Philippines experiences about 20 tropical cyclones a year on average; floods and flash floods accounted for 72% of the population affected in Laos between 1990 and 2018; and Thailand's 2011 floods caused manufacturing losses alone of about US$27 billion. Vulnerability concentrates in three interlinked areas: water and food security with ocean-based livelihoods, the economic security of densely populated coastal cities, and public health under hot and humid conditions. Major cities such as Bangkok and Jakarta face an added urban heat island effect of 2–7°C on top of global warming.

Countries across the region have built policy systems led by National Adaptation Plans, climate strategies, and NDCs, supported by sectoral plans and local action, and adaptation is shifting from a specialist portfolio of environment ministries into the mainstream of long-term development, though progress is uneven. The three priority directions are resilience of coastal infrastructure, upgraded urban flood control and drainage, and monitoring and early warning of compound risks. The key constraints are insufficient capacity to monitor compound risks spanning islands, coasts, and river basins, weak coordinated governance of transboundary basins and ocean risks, and pronounced resilience gaps in water, food, and coastal infrastructure; these are interlocked, and no single country or ministry can resolve them alone.

Case from Southeast Asia

Case: China-Laos cooperation trials of climate-resilient crop varieties

Addressing Laos's problems of high heat and heavy rain, poor soils, and frequent floods, the China-Laos Crop Variety Testing Station, jointly built by Guangxi Vocational University of Agriculture and the National Agriculture and Forestry Research Institute of Laos, has operated since 2013. The station has introduced and trialed more than 380 varieties and selected 73 high-yielding, high-quality, disease-resistant varieties suited to local ecology. Supporting extension of extreme-weather-adapted cultivation and pest-control techniques has greatly raised the climate resilience of local agriculture. The station also serves as an international training base of the China-Laos Modern Agriculture Craftsman College: it has held more than 60 training sessions for over 3,000 local agricultural personnel, and the Golden Flower Village agricultural poverty-reduction demonstration project it leads in Vientiane has raised greenhouse growers' monthly incomes by about RMB 1,000 on average and rice yields by 50 kg per mu. The project has strengthened Laos's food security and, through demonstration and experience sharing, driven the spread of climate-resilient cultivation techniques in neighboring countries, becoming a model of China-Laos poverty-reduction cooperation.



Dragon fruit plantation at the core headquarters base of the China-Laos Crop Variety Testing Station

6.2 South America

South America's economic structure depends heavily on climate-sensitive sectors: agriculture accounts for about 6.5% of regional GDP and 13% of employment, and Brazil's agribusiness complex for about 27% of GDP; the region holds over 40% of global copper reserves and more than half of proven lithium reserves; Paraguay relies almost entirely on hydropower for electricity. About 90% of the population lives within 500 kilometers of the coast, so population, assets, and water resources are spatially mismatched, and climate risk concentrates in high-exposure areas before travelling through agricultural and mineral supply chains to the rest of the world.

South America faces rapid warming, accelerating ecological change, and mounting extreme events. The period 1991–2025 was the warmest 30-year span on record for South America. In 2024, the regional average temperature was 0.90°C above the 1991–2020 mean; extreme temperatures in the Amazon are rising about 0.5°C per decade, twice the global average; and the tropical Andean glaciers have retreated to their lowest extent in about 11,700 years, even as they still supply water to some 90 million people. The Amazon basin suffered a historic drought in 2023–2024, and forest disturbance reached 6.64 million hectares in 2024, up 152% year on year. Regional risk is defined by abrupt drought-flood swings, which can be grouped into four types: extreme drought and worsening water security; rainstorm flooding, landslides, and sea-level rise; forest degradation, wildfire, and ecosystem tipping points; and linked failures across agriculture, health, energy, and urban systems. Countries differ markedly in emphasis, so regional policy cannot follow a single template.[25]

All 12 countries of the region have incorporated adaptation into national climate policy, and nine have submitted national or sectoral adaptation plans. Chile has for the first time given adaptation a central place in law through its Framework Law on Climate Change, and Brazil has built the world's largest tropical forest remote-sensing monitoring system. Ecosystem-based adaptation is the cheapest strategy with the highest co-benefits; agricultural adaptation must answer the demands of both export agriculture and smallholders; and water adaptation has the strongest cross-sectoral spillovers; together these form the three priority directions. The main constraints are insufficient coordination across government, weak foundations for observation and risk data, and underdeveloped systems for measuring adaptation results and financing adaptation.

25 WMO, *State of the Climate in Latin America and the Caribbean 2024* (Geneva: WMO, 2025).

6.3 Africa

Africa is the continent with the largest concentration of Global South countries, the highest climate vulnerability, and the weakest adaptive capacity. Its rain-fed agricultural economy converts climate shocks directly into livelihood risks along the chain of "hazard–harvest loss–livelihood damage–food insecurity." Rapid and youthful population growth, rural poverty, infrastructure deficits, and a broader development gap compound one another, and smallholders and pastoralists are the most vulnerable groups. The development deficit and the adaptation deficit are deeply intertwined.

The continent is warming faster than the global average: Ghana warmed about 1°C between 1960 and 2003, Kenya about 1°C since 1960, and Zambia about 1.3°C over the same span. Rainfall is sharply differentiated across space: the Sahel shows a pattern of recovering total precipitation but lengthening dry spells and more short-duration heavy rain; southern Africa is trending warmer and drier; and coastal and island states face sea-level rise on top of this, so drought and flood coexist and are evolving into compound, systemic risks. In 2025 alone, extreme weather and climate events affected at least 13 million people and killed more than 3,000, with floods accounting for over half of reported events. Food security is the most critical vulnerable link: about 98% of Kenya's agriculture and more than 80% of Burundi's depend on rainfall, and only about 2% of Ghana's arable land is irrigated.

Of the 77 countries worldwide that had submitted National Adaptation Plans by June 2026, 26 are in Africa, the highest share of any region. Adaptation policy is survival-oriented and deeply bound to poverty reduction and livelihoods, and adaptation action feeds directly into food security and green employment: Ethiopia's Green Legacy Initiative, for example, created 2.24 million jobs. The three priority directions are food security, grassroots meteorological early warning systems, and the resilience of rain-fed agriculture. The key constraints are, first, glaring shortfalls in observation and warning capacity: only about four in ten African countries have multi-hazard early warning systems, and "sparse observation, coarse analysis, imprecise warnings, and information that fails to arrive" keep most areas in post-disaster response. Second, grassroots governance is horizontally fragmented and vertically weak, and unmet needs in agricultural infrastructure compound broader public-service shortfalls.

Case from Africa

Case: Nairobi River basin ecological restoration project, Kenya

On March 10, 2025, the Nairobi River basin ecological restoration and social housing project (contracted by China Energy Engineering Group Guangxi Electric Power Design Institute Co., Ltd.) broke ground in Nairobi, the Kenyan capital. It is Kenya's first ecological and livelihood project of its kind, and an important outcome of China Energy Engineering's implementation of the FOCAC Beijing Summit's "ten partnership actions." The works cover a treated reach of about 27.2 km and an area of about 2.59 million square meters, including the Nairobi River trunk sewer and wastewater treatment plant, source-water restoration and protection, solid-waste clearance, and comprehensive urban landscape upgrading; about 10,000 new housing units are being built in parallel to resettle flood-prone residents. The project organically combines urban flood control with ecological governance, creating a blue-green interwoven system integrating flood safety, ecological conservation, public space, and living conditions. Once complete, it will effectively ease Nairobi's rainstorm flooding, improve residents' living environment, and generate more than 40,000 local jobs, making it a model of China-Africa urban ecological and climate governance cooperation.



The Nairobi River basin ecological restoration project began construction in 2025

6.4 Central Asia

All five Central Asian countries are landlocked, and the binding constraint on adaptation lies not in resource endowment but in regional coordination: the areas where water originates and the main areas of water use sit in different countries upstream and downstream, water and energy are tightly coupled, and coordination mechanisms are inadequate. About 95% of Turkmenistan's cropland depends on irrigation, and agriculture uses about 90% of the country's water; over 90% of electricity in Kyrgyzstan and Tajikistan comes from hydropower. Climate impacts propagate along the chain from mountain water sources to transboundary rivers and downstream oases.

The whole region is warming steadily: Kazakhstan's annual mean temperature has risen 0.24–0.56°C per decade, and Turkmenistan has warmed about 2°C over the past 60 years. Glaciers and snowpack are melting faster: glaciers in the Tian Shan range within Uzbekistan have lost 25–30% of their area over the past century, and under 2°C warming, glacier volume in some basins is projected to more than halve by 2050. The result is a seasonal mismatch: more spring snowmelt floods alongside water shortages during the July–August irrigation peak. About 74% of the Amu Darya's runoff comes from snow and ice melt, so runoff volume and its seasonal distribution simultaneously constrain downstream irrigation, upstream hydropower, and transboundary allocation. The result is a compound water-food-energy risk, alongside desertification, salinization, saline dust, and infrastructure safety pressures. In 2024, rapid snowmelt combined with heavy rain triggered severe floods in Kazakhstan, with economic losses of about KZT 300 billion.

Adaptation policies across the region focus on water security and drought-related ecological risk, with action concentrated in water-saving facilities and technology, restoration of degraded ecosystems, and monitoring, warning, and disaster prevention. Uzbekistan has applied water-saving technology on 1.266 million hectares (about 30% of its irrigated land) and has afforested more than 1.7 million hectares on the dried bed of the Aral Sea. The region as a whole is moving from establishing frameworks to building implementation capacity: the Dushanbe Glaciers Declaration and the five countries' joint climate adaptation strategy have set glacier protection and joint monitoring as priorities. The three priority areas are transboundary water security, glacier monitoring and protection, and climate-resilient agriculture, pastoralism, and ecological livelihoods. The three key constraints are the tight water-energy coupling and the limited resilience of energy systems; the long-term and partly irreversible nature of glacier and high-mountain ecosystem degradation; and the compounding of water constraints, irrigation dependence, and land degradation.

Case from Central Asia

Case: Aral Sea basin ecological governance and integrated photovoltaic demonstration project

Addressing the ecological crisis, water scarcity, and desertification of the Aral Sea basin, the Xinjiang Institute of Ecology and Geography of the Chinese Academy of Sciences, together with the Aral Sea International Innovation Center of Uzbekistan, has advanced the project "Integration, Testing, and Demonstration of Photovoltaic Technology in the Ecological Governance of the Aral Sea Environment." The project has been selected for the Collection of Outstanding ESG Practices of Enterprises in Central Asia as the only research-institution project included. In Nukus, the partners built the first 3-hectare trial zone for water-saving agriculture on heavily salinized land, combining PV with drip irrigation and integrated smart water-fertilizer control: through mulched drip irrigation for cotton, photovoltaic power, and smart fertigation, the zone has recorded yield gains of more than 100% and water savings of over 30% for two consecutive years. In Muynak, a "PV + ecology" halophyte garden has been built, using PV pumping to irrigate more than ten salt-tolerant species such as Suaeda salsa, Salicornia, and saxaul. The project charts a climate adaptation path that advances ecological restoration, agricultural upgrading, and energy development in concert, providing key technical support for governing the Aral Sea basin.



Photovoltaic automatic backwash irrigation water filtration system at the Aral Sea International Innovation Center's demonstration park

6.5 The Middle East

The Middle East is an important strategic corridor linking Asia, Europe, and Africa and an important region for Belt and Road cooperation. Its adaptation is centered on safeguarding water security through engineered systems: desalination and the water-energy coupling are a distinctive advantage, yet they also bind water supply security tightly to energy provision and fiscal capacity, making this coupling the systemic risk that countries most need to guard against. The region is dominated by desert, with population and industry highly concentrated in low-lying coastal belts and narrow river valleys; agriculture depends heavily on irrigation and food on imports, and inherent resource scarcity compounded by climate change creates multidimensional systemic vulnerability.

The region is warming about twice as fast as the global average: in 2025, its average temperature was 1.08°C above the 1991–2020 baseline; Bahrain warmed about 2°C between 1940 and 2021; and heatwaves above 50°C are becoming normal. Kuwait, the United Arab Emirates, and Morocco have recorded 54°C, 51.5°C, and 50.4°C respectively. In Cairo, nearly half of peak-summer electricity goes to air conditioning. Rainfall is trending drier overall, following a pattern of prolonged drought punctuated by sudden flash floods: Morocco's 2023 rainfall was 48% below normal and Egypt's has fallen 22% over three decades; coastal zones face the chain of impacts from sea-level rise, storm surge, and seawater intrusion; and recharge in some Algerian aquifers has fallen by as much as 73.7%.

Drawing on strong state mobilization capacity, countries have incorporated adaptation into national development strategies, energy transition plans, and infrastructure systems, forming a policy path centered on water security and coupled water-energy management. Desalination is shifting from energy-intensive thermal processes to reverse osmosis coupled with solar and wind power: about 70% of Saudi Arabia's drinking water comes from desalination, and the UAE's aquifer storage and recovery system can sustain 90 days of supply in an emergency. The three priority directions are protection of human settlements under extreme heat, engineered water-security systems, and urban climate resilience. The three structural weaknesses to remedy are overreliance on engineered water supply, which makes the system energy-intensive and lets power fluctuations translate directly into water-supply risk; low recovery thresholds of arid ecosystems, which leave severely degraded areas unable to repair themselves in the short run; and lagging urban heat governance, which relies heavily on mechanical cooling while ecological cooling is rigidly constrained by water scarcity.

6.6 East Asia

East Asia's Global South is dominated by China and Mongolia, and its climate risk profile combines coastal, inland, and plateau exposure. China's eastern seaboard holds dense ports, industrial belts, and megacity clusters, where sea level rise, typhoon storm surges, extreme rainfall, and heatwaves hit infrastructure and supply chains with effects that travel well beyond the coast; the northwest and north

China face drought, temporal and spatial water imbalance, and desertification. Mongolia is deeply landlocked, with extensive dry grassland and desertified land, and extreme cold, blizzards, dust storms, and pasture degradation pose direct threats to herders' livelihoods and food security.

Climate risk in East Asia is shifting from single hazards to compound, cascading risk. Sea level along China's coast is rising faster than the global average, and the combination of typhoon storm surges and extreme rainfall is worsening urban flooding and coastal erosion; the rare consecutive summer-autumn drought in the Yangtze basin in 2022 and the extreme rainstorms in north China in 2023 show that drought and flood now alternate at the regional scale. Heatwaves are becoming more frequent and more intense, putting compound pressure on aging populations, outdoor workers, and energy systems. Blizzards in Mongolia are highly sudden and wide-ranging, capable of killing large numbers of livestock within days and striking directly at pastoral livelihoods and food security; dust storms reinforce desertification and pasture degradation and affect the atmosphere of East Asia across borders.

China has elevated climate adaptation to a national strategic priority. The National Climate Change Adaptation Strategy 2035 sets adaptation tasks for priority regions and sectors, and adaptation action has advanced steadily in recent years; Mongolia has also set out policies in its national adaptation plan and its desertification control measures. Both countries face the same challenge of moving from national plans to local implementation. In China, retrofitting existing infrastructure is costly, regional development is uneven and adaptive capacity varies widely, and extreme heat poses persistent health risks to older people and outdoor workers. In Mongolia, meteorological and hydrological stations are sparse, early warnings do not travel effectively to the local level, finance and technical capacity are in short supply, and weak pastoral infrastructure and public services constrain delivery.

6.7 South Asia

South Asia is densely populated and has a high share of agricultural employment, with population and assets concentrated in the Ganges-Brahmaputra Delta, coastal belts, and the valleys on the southern flank of the Himalayas. Infrastructure safety in the region is closely tied to climate risk, and water supply is shaped jointly by monsoon rainfall and glacial meltwater. Climate impacts therefore readily spread from local disasters into public health and infrastructure.

On climate, South Asia has continued to warm in recent years, with fluctuating monsoon rainfall compounding high-mountain glacier retreat: the Hindu Kush-Himalayan region has warmed about 0.2°C per decade over the past 50 years, and Nepal's mountain glaciers have lost nearly a third of their ice volume in just over three decades. Regional vulnerability concentrates in agriculture and water resources, high-mountain transport infrastructure, and deltas and low-lying coasts. The dominant hazards are rainstorm flooding, extreme heat, glacial lake outbursts, and coastal storm surges, and extreme events in the region are becoming more frequent. The 2022 floods in Pakistan affected about 33 million people and caused about US$30 billion in losses. On August 26, 2026, an ice-rock avalanche occurred at about 5,200 m elevation on a glacier of Mount Langtang Lirung in Nepal; some six to seven minutes later, a debris flow raced about 22 km downstream to the Gyirong port of entry in Tibet, China, destroying 27 buildings and, as of September 2, leaving 21 people dead and 541 missing. This cross-border cascading disaster caused by glacier destabilization was the second catastrophe of its kind in the Gyirong valley in just over a year, after a July 2025 glacial lake outburst destroyed the China-Nepal Friendship Bridge. In addition, sea-level rise combined with land subsidence keeps raising the risk of saltwater intrusion and storm surges in Bangladesh's low-lying coastal areas and the Maldives' atolls.[26] [27]

Countries have incorporated adaptation into national climate policy and are translating it into sectoral and local implementation: Bangladesh's National Adaptation Plan runs to 2050 with funding needs of about US$230 billion; Pakistan issued its first National Adaptation Plan after the 2022 floods; and Nepal links national policy with grassroots action through Local Adaptation Plans of Action.

6.8 Pacific Small Island States

The Pacific small island states have tiny land areas, dispersed islands, and vast exclusive economic zones, with population and infrastructure highly concentrated in coastal strips. The core of adaptation is securing safe settlement, freshwater supply, and ocean livelihoods on limited land. The economies depend heavily on fisheries, tourism, and remittances: in countries such as Tuvalu, more than 40% of government revenue comes from fishing-license fees, so changes in marine ecosystems affect household incomes and public finance alike. Limited territorial space and a relatively undifferentiated economic structure reinforce each other, so that coastal disasters and changes in marine resources readily become nationwide development pressures.

The region faces the combined effects of sea-level rise, marine heatwaves, and tropical cyclones, with sea level in the southwest Pacific rising faster than the global average. In 2024, nearly 40 million square kilometers of ocean, the largest area on record, were affected by marine heatwaves. Continued ocean warming intensifies coral bleaching and raises the risk of tuna stocks shifting eastward, threatening the

26 International Monetary Fund, *Pakistan: 2023 Country Report* (Washington, DC: IMF, 2023).

27 China Daily, "Press Conference on the Gyirong Mudslide Disaster in Tibet," August 30, 2026, accessed September 18, 2026, https://cn.chinadaily.com.cn/a/202608/30/WS6a93c65fe4b09a165c786ce9.html.

economies of fishing-dependent island states. Tropical Cyclone Pam in 2015 caused losses in Vanuatu equivalent to about 64% of GDP, showing how small economies struggle to absorb major disasters. Vulnerability concentrates in coastal living space, freshwater and food security, and the ecological base of fisheries and tourism: low-lying atoll states such as Tuvalu and Kiribati face saltwater intrusion and inundation, several uninhabited reef islands of the Solomon Islands have already disappeared, and the adaptation space of some island states is being squeezed by long-term sea-level rise.[28]

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The region has built an adaptation system linking regional frameworks with national policies. The Pacific Resilience Framework, the Boe Declaration, and the 2050 Strategy for the Blue Pacific Continent tie climate action to development and security; Fiji is advancing adaptation in high-risk communities through its National Adaptation Plan, its Climate Change Act, and planned-relocation guidelines; and the island states also practice rainwater harvesting, desalination, and ecosystem-based coastal protection.

6.9 Central America and the Caribbean

Central America and the Caribbean form the land bridge between the American mainland and the Caribbean islands. The economies are highly open, and several countries depend strongly on tourism and export agriculture, so damage to climate-sensitive sectors feeds quickly into employment, foreign-exchange earnings, and public finance. In 2023, tourism and related industries accounted for about 66% of GDP in Saint Lucia, 34% in Jamaica, and 23% in Barbados; island economies also rely heavily on imported food and fuel. High debt further compresses the space for adaptation investment: in 2024, general government debt in the Caribbean (excluding Guyana and Haiti) averaged about 77% of GDP, and disaster reconstruction continues to compete with long-term resilience investment for scarce fiscal resources.[31] [32]

28 World Bank, East Asia and Pacific Macroeconomic and Poverty Outlook (Washington, DC: World Bank, 2021).

29 WMO, State of the Climate in the South-West Pacific 2024 (Geneva: WMO, 2025).

30 Government of Vanuatu, Post-Disaster Needs Assessment: Tropical Cyclone Pam (Port Vila: Government of Vanuatu, 2015).

31 World Bank, "Rethinking Tourism in the Caribbean: Diversifying Investment for Resilience and New Paths to Growth," October 8, 2024, accessed September 18, 2026, https://www.worldbank.org/en/topic/tourism/publication/rethinking-tourism-in-the-caribbean.

32 International Monetary Fund, Regional Economic Outlook: Western Hemisphere (Washington, DC: IMF, 2024).

The region is experiencing sustained warming, sea-level rise, and marine ecological degradation: since 1991, average warming in Latin America and the Caribbean has run about 0.2°C per decade, and the Caribbean sea level rose 3.6 mm a year between 1993 and 2020, above the global average of 3.3 mm over the same period. Hurricanes and the accompanying heavy rain and coastal disasters inflict severe losses on countries in the region: Hurricane Maria in 2017 caused losses in Dominica equivalent to about 226% of GDP, and Hurricane Melissa in 2025 caused about US$8.8 billion in direct economic losses in Jamaica, roughly 41% of GDP. Coral bleaching and massive sargassum influx driven by ocean warming further weaken the base of coastal tourism and fisheries. Risks concentrate in housing and critical infrastructure, water resources and agricultural production, and marine and coastal ecosystems, and they weigh on the economy through shutdowns and reconstruction spending.[33] [34] [35] [36]

Adaptation in the region rests on regional cooperation and national plans. The Caribbean Community Climate Change Centre works to mainstream adaptation into sustainable development, and Saint Lucia, Grenada, and others implement sectoral action through National Adaptation Plans and NDCs. The Caribbean Catastrophe Risk Insurance Facility shares disaster risk through sovereign parametric insurance with multi-country participation, and Barbados has explored adaptation financing through a "debt-for-climate-resilience" swap, though long-term investment remains constrained by fiscal conditions.

33 WMO, *State of the Climate in Latin America and the Caribbean 2021* (Geneva: WMO, 2022).

34 WMO, *State of the Climate in Latin America and the Caribbean 2020* (Geneva: WMO, 2021).

35 World Bank, *Post-Disaster Needs Assessment: Hurricane Maria, September 18, 2017, Dominica*, November 15, 2017, accessed September 18, 2026, https://reliefweb.int/report/dominica/post-disaster-needs-assessment-hurricane-maria-september-18-2017.

36 World Bank, *Global Rapid Post-Disaster Damage Estimation (GRADE) Report: Hurricane Melissa* (Kingston: World Bank, 2025).

7. Priority Areas for Building Climate Resilience in the Global South

7.1 Water Security

Water security is the most widely shared priority. Global South countries generally rank water management as a priority: Southeast Asia focuses on river-basin management and controlling seawater intrusion; South America on Andean glaciers and Amazon hydrology; Africa on small-scale rainwater harvesting and irrigation upgrading; Central Asia on integrated transboundary river management and Aral Sea governance; the Middle East on desalination and wastewater reuse; East Asia on the twin pressures of water supply security for coastal megacity clusters and storage for extreme rainfall; and the Pacific and Caribbean islands on rainwater harvesting, desalination, and ecosystem-based coastal protection. Countries broadly call for stronger transboundary water cooperation, shared hydrological data, and better storage, conveyance, and water-saving infrastructure.

7.2 Food Security and Agricultural Resilience

Food security and agricultural resilience are the most fundamental priority. Africa centers on strengthening rain-fed agriculture through drought-tolerant varieties and conservation tillage; South America addresses the dual adaptation of export agriculture and smallholders, developing climate-smart agriculture and index insurance; Central Asia focuses on water-saving irrigated agriculture and grassland management; Southeast Asia emphasizes the flood and drought resilience of rice systems; and the Middle East promotes water-saving agriculture on limited arable land. Countries broadly call for linking agricultural adaptation with poverty reduction and food sovereignty, and for protecting the production methods of smallholders and indigenous peoples.

7.3 Infrastructure and Urban Resilience

Infrastructure and urban resilience are the key concern in densely populated regions. Coastal cities in Southeast Asia and the Middle East need upgraded flood control, drainage, and coastal protection; cities at the foot of the Andes in South America must guard against flash floods and landslides; African cities need stronger drainage, water supply, and sanitation; Central Asian cities must cope with heat and flood shocks together; and East Asian megacity clusters need to align resilience standards for retrofits and new projects alike. Countries broadly call for embedding climate risk assessment and resilience standards across infrastructure to avoid lock-in, with particular attention to informal settlements and low-income communities.

7.4 Ecosystem Protection and Nature-Based Solutions

Ecosystem protection and nature-based solutions are the most cost-effective adaptation path. Protection of the Amazon rainforest in South America has global significance, and actions such as Aral Sea governance and desert restoration in Central Asia, mangrove and coral reef restoration in Southeast Asia, forest restoration and land degradation control in Africa, and coastal wetland and grassland restoration in East Asia are all regarded by countries as core adaptation strategies.

7.5 Climate Monitoring, Early Warning, and Information Services

Climate monitoring, early warning, and information services are a shared shortfall and an urgent need in every region. Statistics from the World Meteorological Organization (WMO) and the United Nations Office for Disaster Risk Reduction (UNDRR) show that only about 60% of countries worldwide have established multi-hazard early warning systems, with coverage in Africa and small island developing states at just 40% and 43% respectively, so the goal of "Early Warnings for All" remains far from achieved. At the regional level, grassroots warning systems lag severely in Africa; South America's capacity to monitor and respond to compound risks is insufficient; Southeast Asia lacks monitoring that spans islands, coasts, and river basins; Central Asia's glacier and snowpack monitoring network is incomplete; high-resolution observational data are weak in the Middle East; East Asia faces gaps in coordination on monitoring and early warning for transboundary dust storms and severe weather. Countries broadly call for stronger observation networks, multi-hazard compound warning systems, and better delivery of climate information down to the grassroots.[37]

7.6 Public Health and Social Protection

Public health and social protection are also receiving growing attention. Dengue in Southeast Asia, heat-related illness in South America, malaria in Africa, heat stress among outdoor workers in the Middle East, and heat risk in aging East Asian societies all require countries to bring climate-health risks into public health systems and to build climate-responsive social protection mechanisms.

37 UNDRR and WMO, *Global Status of Multi-Hazard Early Warning Systems 2025.*

8. Developed Countries Should Support Climate Adaptation in the Global South

Under the United Nations Framework Convention on Climate Change and its Paris Agreement, developed countries are required to provide developing countries with support in finance, technology, and capacity building. The gap between that obligation and what the Global South actually needs remains wide, and it is not narrowing.

8.1 Finance

On finance, the US$100 billion a year target was only barely met in 2022, two years late, and how it is counted and what has actually been delivered remain contested among Global South countries. At COP26, developed countries undertook to double adaptation finance from 2019 levels to about US$40 billion a year by 2025, but OECD data show adaptation finance slightly below US$35 billion in 2024, and the 2025 target is "highly unlikely" to be met; cuts to climate finance commitments by the United States and some European countries have further dimmed the prospects. In response to the Global South's three concerns about the scale, quality, and accessibility of climate finance, developed countries should take the lead, mobilizing at least US$300 billion a year for developing countries by 2035, moving toward the US$1.3 trillion goal through the Baku to Belém Roadmap, and implementing the COP30 decision to at least triple adaptation finance for developing countries by 2035. On that basis, the share of grants should increase and loan terms should become more concessional so that finance reaches the least developed countries and small island states first; application procedures should be simplified, support for project preparation strengthened, and predictable multi-year commitments established.

Beyond public finance, market mechanisms should serve as a complement. The Baku to Belém Roadmap lists mobilizing private finance and lowering the cost of capital among its directions for action. The precondition for market capital to enter adaptation is an improved risk-return structure for projects. This requires grants and concessional funding from developed countries to absorb early-stage project risk, and multilateral development banks to share downstream risk with commercial capital through guarantees, first-loss arrangements, and similar instruments. As noted in section 4, the potential of private adaptation finance remains largely untapped, and how far it is realized depends heavily on the risk-bearing capacity of public finance. One point must be clear, however: market finance complements rather than replaces public finance, and the obligation of developed countries to contribute cannot be played down on the grounds of mobilizing market capital.

8.2 Technology

On technology, patents for adaptation technologies are heavily concentrated in a small number of developed economies, and the existing international intellectual property regime provides de facto shelter for technology monopoly. Global South countries have repeatedly proposed exemptions or compulsory licensing for critical climate technologies in the WTO and other forums, but have met sustained resistance. A fair and equitable technology transfer mechanism should be established, intellectual property barriers lowered, and support given to research, development, and local adaptation of technologies for drought early warning, water-saving irrigation, stress-tolerant crops, coastal protection, and renewable-energy desalination. As noted above, there are still pronounced gaps in multi-hazard early warning coverage worldwide, and demand for such technical support is especially pressing. Technology transfer should not stop at exporting equipment; it should also include the systematic transfer of knowledge, skills, and institutional capacity.

8.3 Capacity Building

On capacity building, what matters is not the number of short courses or participants but whether developing countries acquire autonomous adaptation capacity. Support should be strengthened for adaptation planning, MRV systems, project management, risk assessment, and grassroots implementation, so that finance, technology, and capacity form an integrated package rather than fragmented measures that each address only one part of the problem.

8.4 Global Governance

On global governance, the 59 Belém Adaptation Indicators adopted under the Global Goal on Adaptation (GGA) should be implemented to set a common benchmark for measuring the effectiveness of international support. Multilateral development banks should be encouraged to adjust their financing models and expand the supply of adaptation finance, and trade protectionism in the name of "green barriers" should be opposed, so that adaptation action advances in step with the Sustainable Development Goals and a just transition.

9. Directions for Action on Climate Resilience in the Global South

External support is a necessary condition, but the results of adaptation action ultimately depend on Global South countries improving their own governance capacity and choosing their own development path. National circumstances vary widely, and action pathways must rest on each country's stage of development and fiscal capacity rather than being transplanted wholesale.

9.1 Continue to Deepen Climate Governance Reform and Carry Adaptation Plans Through to Implementation

Many Global South countries already have a national adaptation plan or strategy. Governments need to establish a cross-departmental coordination mechanism for climate adaptation, define the responsibilities of the climate, water, agriculture, energy, and finance ministries, maintain routine channels for information sharing and consultation, and link nationally determined contributions with national adaptation plans so that ministries do not work in isolation around dispersed objectives. Adaptation planning should be translated from statements of principle into operational budget arrangements, specifying the incremental cost of adaptation, the source of funding, and the sequence of implementation item by item, so that sectoral and local plans genuinely enter annual budgets and project pipelines. The observational and monitoring base also needs strengthening: meteorological and hydrological networks should be densified step by step through existing regional and multilateral mechanisms, data standards unified, and a closed loop from risk assessment to performance feedback established, so that every adaptation action is measurable, reportable, and verifiable. In parallel, countries should build their capacity to prepare high-quality projects, which is the precondition for accessing international finance.

9.2 Act within National Means and Sequence Adaptation Work by Stage of Development

Levels of development across the Global South differ widely, as do leading hazards, fiscal space, and starting points for adaptation, so each country should set its own priorities according to its stage of development, main hazard types, and fiscal capacity. For the least developed countries and small island developing states, the immediate task is to protect lives and keep essential services running; limited resources should go to disaster prevention and reduction, early warning, basic water supply, and lifeline infrastructure such as transport and power, addressing first the risks that bear directly on survival. For middle-income countries, the window offered by rapid industrialization and urbanization should be used to build climate resilience requirements into new infrastructure, urban planning, and industrial policy from the outset, avoiding the lock-in that comes from designing to historical climate baselines and paying heavily to retrofit later. For countries carrying heavy debt and with limited fiscal space, the priority is to

distinguish urgent from important between reconstruction spending and development investment, favor nature-based, lower-cost, faster-yielding adaptation measures, and direct limited funds to where avoided losses are greatest, so that adaptation investment genuinely turns into development dividends.

9.3 Tap Domestic Potential and Broaden Funding Channels to Make Adaptation Finance More Sustainable

While continuing to press developed countries to honor their commitments, countries should also turn financing pressure into momentum for reform. Domestic public finance should be allocated better: tagging climate-related expenditure in budgets and ranking it by benefit would direct scarce domestic funds to where avoided losses are greatest. Risk transfer and innovative financing instruments should be used actively; drawing on the Caribbean parametric insurance pool and "debt-for-climate-resilience" swaps, countries can explore sovereign catastrophe insurance, climate bonds, and payment for ecosystem services, converting the repeated fiscal shock of individual disasters into predictable, shareable risk arrangements. Domestic green finance should be developed: adaptation projects should be admitted to national green finance catalogues and made eligible for green bond proceeds, bringing them into green credit and bond markets. Improving the investment environment and project preparation capacity would turn dispersed adaptation needs into bankable projects that meet the requirements of international funds and private investors, crowd in private capital, and gradually build a diversified financing structure in which public finance, international funds, private capital, and risk instruments complement one another.

9.4 Deepen Regional Coordination and South-South Mutual Assistance, Turning Shared Vulnerability into a Common Agenda

Climate risk crosses borders, travelling along rivers, basins, and disaster chains, and no single country can address it alone. While continuing to make the case internationally, Global South countries should build cooperation networks of their own: regional platforms for joint monitoring, shared early warning, and coordinated emergency response around transboundary rivers, cross-border disaster chains, and shared climate data, in areas such as transboundary water in Central Asia, basin and marine risk in Southeast Asia, high-mountain cryosphere hazards in South Asia, and transboundary dust storms and severe weather in East Asia. Such platforms lower the cost of duplicated investment and break down fragmented governance. A collective voice in multilateral negotiations would strengthen the bargaining power of developing countries and turn widely shared vulnerability concerns into workable proposals for international financial reform. South-South exchange of low-cost, appropriate technologies and practical experience should be expanded, spreading localized approaches to dryland and semi-arid agriculture, water-saving irrigation, ecological restoration, and meteorological early warning, so that countries depend less on a single external technology pathway and find an adaptation path suited to their own resource endowments.