

H HEURISTICS

Navigating a Changing World

Convergence Before Crisis

Accelerating Global Development to Reduce Systemic Vulnerability

How air pollution, heat, hunger and poverty harm the body and mind, how feedback loops make the suffering self-reinforcing, and why it will be prolonged for centuries in the regions where survival is most at risk

H Heuristics · Hunter Hughes

Research Report · October 2026

Abstract

The conventional case for accelerating development in poor countries is moral and economic. This report adds a third argument: timing. Between roughly 2040 and 2060 several slow-moving stresses are expected to peak together, among them dangerous heat, water stress, record populations in the most exposed regions, a very large cohort of young workers and heavy debt burdens. Systemic vulnerability, the chance that a shock in one place becomes a loss of life, income and capacity that spreads, is the product of hazard and sensitivity. Mitigation slows the first term over decades. Development lowers the second far faster, and in the places where it is highest. The thesis is that convergence, in income and above all in capability, must come before crisis, and that the window to achieve it is open but narrowing.

The evidence for the present is sobering. Low-income countries average under US\$700 a head, about 1 per cent of the high-income level, and climbing to the point at which middle-income economies typically stall would take 123 years at 2 per cent growth, 50 at 5 per cent and 36 at 7 per cent; reaching it by 2050 would require about 10.7 per cent a year. The 2020s have gone badly: the World Bank expects one third of low-income and half of fragile economies to end 2026 poorer than in 2019. Aid fell about 23 per cent in real terms in 2025; 3.4 billion people live in countries that pay more interest than they spend on health or education; adaptation finance is about a twelfth of need; and a 2026 energy and fertiliser shock has hit import-dependent economies hardest. Extreme poverty is concentrating in fragile Sub-Saharan Africa, 655 million people lack electricity, and 3.8 billion lack any social protection. Yet the record also shows that vulnerability can fall faster than income: Bangladesh cut cyclone deaths from about 300,000 in 1970 to about two dozen in 2020, and Odisha did the same on a smaller scale, by building warning systems, shelters and community capacity.

The report develops a framework of hazard, sensitivity and three levers, assesses seven vulnerability archetypes, identifies seven accelerators that raise income and cut vulnerability together, and presents a stylised Convergence Race Model. Under current policies, baseline growth leaves vulnerability per person roughly flat to 2050 (0.98 of the 2025 level) while the population-weighted burden rises by about 37 per cent. A combined package of faster growth and targeted capability building cuts cumulative exposure over 2026 to 2075 by about 40 per cent, each lever alone delivering about 22 to 23 per cent, and keeps the burden below its 2025 level in 91 per cent of draws against 3 per cent for the baseline. Starting the package ten years late forfeits roughly 30 per cent of the benefit. The report concludes with a financing strategy, a three-phase roadmap, a set of indicators and an assessment of the objections. Its message is that the cheapest window for building resilience is the one that is open now.

Keywords: economic convergence; systemic vulnerability; development; resilience; early warning; social protection; energy access; debt and finance; adaptation; polycrisis; climate risk; Global South

JEL classification: O11, O19, O44, Q54, F35, I32; economic development; environment and growth; climate and natural disasters; foreign aid; poverty

Data and method: This report synthesises primary and authoritative secondary sources through October 2026; every quantitative claim is linked inline. Figures 3 and 5 to 16 and 18 report values from cited sources; Figures 1, 2 and 25 are conceptual schematics; Figure 4 is a calculation from the compound-growth identity; Figure 17 is an H Heuristics structured assessment; and Figures 19 to 24 come from an illustrative stylised model whose assumptions are stated (Appendix A). Burden figures overlap and must not be summed. The report is analytical rather than predictive, and contains no investment advice.

Contents

The table below is a field. If it appears blank on first open, right-click it and choose “Update Field” (Word usually does this automatically).

1. Introduction: A Race Between Development and Disaster	4
2. The Convergence Record and Its Stall	8
3. Systemic Vulnerability: Concept, Measurement and Evidence	12
4. The Clock: Hazards, Demography and the Closing Window.....	16
5. Where Convergence Is Stalling: People, Poverty and the Power Gap	20
6. The Financing Squeeze and the 2026 Shock	23
7. The Geography of Vulnerability: Seven Archetypes.....	26
8. The Accelerators: Seven Levers That Do Double Duty	28
9. A Race Model: How Fast Must Convergence Move?	32
10. Financing the Acceleration	38
11. Governance, Sequencing and a Roadmap	40
12. Objections, Risks and Limits	42
13. Conclusion: The Case for Moving First	44
Appendix A. The Convergence Race Model: Specification and Parameters	46
Appendix B. Evidence Grading and Data Notes	48
Appendix C. Selected Sources.....	49

1. Introduction: A Race Between Development and Disaster

The world is running two races at once. In the first, poor economies try to raise incomes, power supply, health, skills and institutions fast enough to close part of the gap with richer ones. In the second, physical hazards, demographic pressure, debt and compound shocks build toward a decade or two in which they strike together. This report argues that the two races are the same race. How much of the first is won before the second peaks decides how many people are harmed, how far shocks spread and whether the recovery from the next crisis is a rebound or a reversal.

1.1 The argument in brief

Systemic vulnerability, in the sense used here, is the chance that a shock in one place becomes a loss of life, income and capacity that spreads through households, firms, public budgets and neighbouring countries. It is the product of two things: how intense and frequent the hazards are, and how sensitive a society is to them. Mitigation works on the first term, slowly and for everyone. Development works on the second, and it does so far more quickly in the places where sensitivity is highest. A household with a grid connection, a concrete roof, a mobile-money account, a vaccinated child and a cash transfer waiting on its phone is a different thing from a household with none of these, even if both face the same flood or the same fortnight of heat.

The evidence that development lowers vulnerability is some of the oldest in the empirical literature on disasters. [Kahn's 2005 study](#) of 73 countries from 1980 to 2002 found that richer countries do not suffer fewer disasters but lose fewer people to them, and that better institutions reduce the toll further. A [CRED review of two decades of disaster records](#) found that lower-income countries had 44 per cent of recorded disasters but 68 per cent of the deaths. The best-known single case is Bangladesh, where the death toll from the great cyclones fell from about 300,000 in 1970 to a few dozen in 2020 as shelters, forecasting, volunteers and rising incomes accumulated. The weather did not change. The country did.

The difficulty is time. Convergence is slow, and the decade now under way is going badly. The World Bank's June 2026 outlook projects global growth of only about 2.5 per cent for the year, the weakest outside a recession in close to two decades, and expects that by the end of 2026 [one quarter of developing economies, one third of low-income economies and half of fragile and conflict-affected economies will be poorer than they were in 2019](#). Official aid fell by about 23 per cent in real terms in 2025, [the steepest drop on record](#). Meanwhile the hazard curve is rising: UNEP's [Emissions Gap Report 2025](#) projects 2.8 °C of warming by 2100 on current policies, and the 1.5 °C threshold will be exceeded, at least temporarily, within the decade.

Three claims follow, and the rest of the report builds the evidence for them. First, **income convergence alone cannot arrive in time**: even a country growing at an exceptional 7 per cent a year would need about 36 years to climb from the average low-income level to the point at which middle-income economies typically stall. Second, **vulnerability can fall faster than income** if capability is built deliberately and early, through early warning, social protection, resilient infrastructure, reliable power and public health, which is what Bangladesh, Odisha and a handful of other cases demonstrate. Third, **the two levers are complements, and delay is costly**: in a stylised model developed in Section 9, a combined acceleration package cuts cumulative exposure by about 40 per cent over 2026 to 2075 under current policies, each lever alone delivers roughly half of that, and starting ten years late forfeits about 12 of the 40 points.

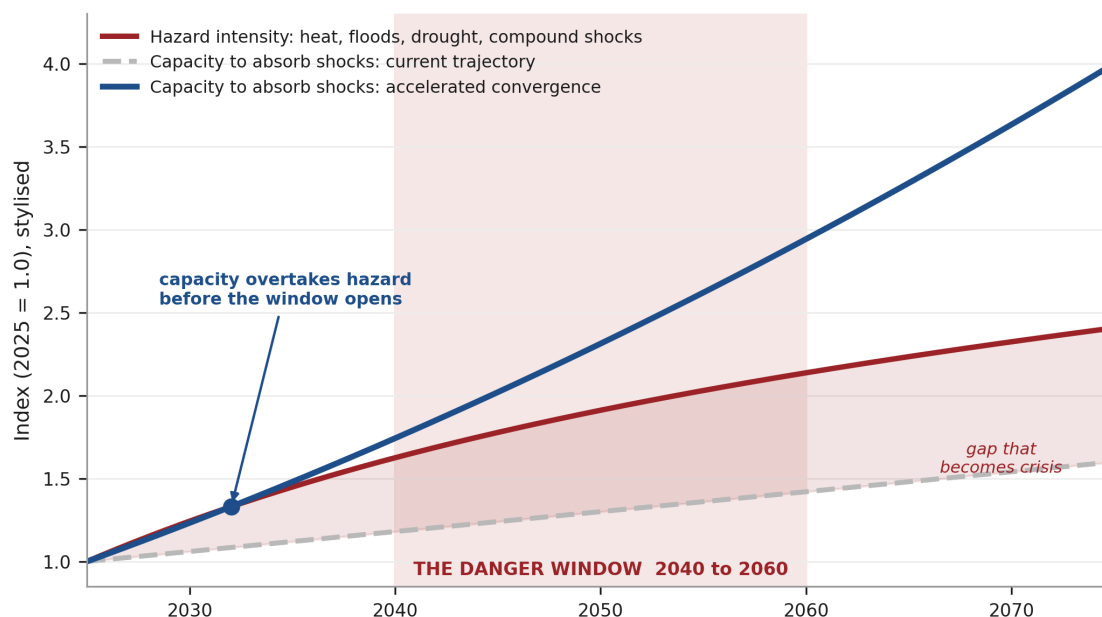


Figure 1. The race: capacity to absorb shocks must overtake hazard intensity before the 2040 to 2060 Danger Window opens.

Source: H Heuristics, conceptual schematic. Curves are stylised and illustrate the argument; they are not forecasts. Section 9 gives a quantified version.

1.2 Why “convergence” and why “before crisis”

Convergence here has a broad meaning. It includes the narrowing of income gaps between poor and rich economies, which economists measure with growth rates and GDP per person, but it also covers the narrowing of gaps in electricity, health, schooling, financial access and public-service quality. The second kind matters more for vulnerability, and it can move faster than the first. The report therefore speaks of *convergence in capability* as well as convergence in income.

The phrase *before crisis* carries a specific claim about timing. H Heuristics has argued elsewhere that the middle of this century contains a Danger Window, roughly 2040 to 2060, in which several slow-moving stresses peak together: dangerous heat for outdoor workers, water stress, peak demand for cooling power, the largest population the planet will carry and a heavy fiscal load from debt and ageing. Each stress is documented independently in the sources cited in later sections, and the claim of this report does not depend on the window being exact. It depends on a weaker and more defensible point. Capacity built before stresses synchronise is cheaper, less contested and more likely to survive than capacity improvised during them. In the language of Figure 1, the question is whether the blue curve crosses the red one before the shaded band begins.

1.3 A simple framework: hazard, sensitivity and the levers that act on them

The analysis rests on a deliberately simple identity. Systemic vulnerability is hazard multiplied by sensitivity. Hazard is driven by the physical climate and by how many people and assets sit in harm's way. Sensitivity is driven by poverty, housing quality, health, dependence on imported food and fuel, the reliability of power and water, and the presence or absence of buffers. Three levers act on the product. *Mitigation* slows the growth of hazard but works over decades. *Convergence*, meaning growth, jobs and

broad-based improvements in living standards, lowers sensitivity across the board. *Capability building* targets the specific buffers that cut sensitivity most cheaply per dollar and can be put in place in years. Finance and governance determine how fast each lever can be pulled.

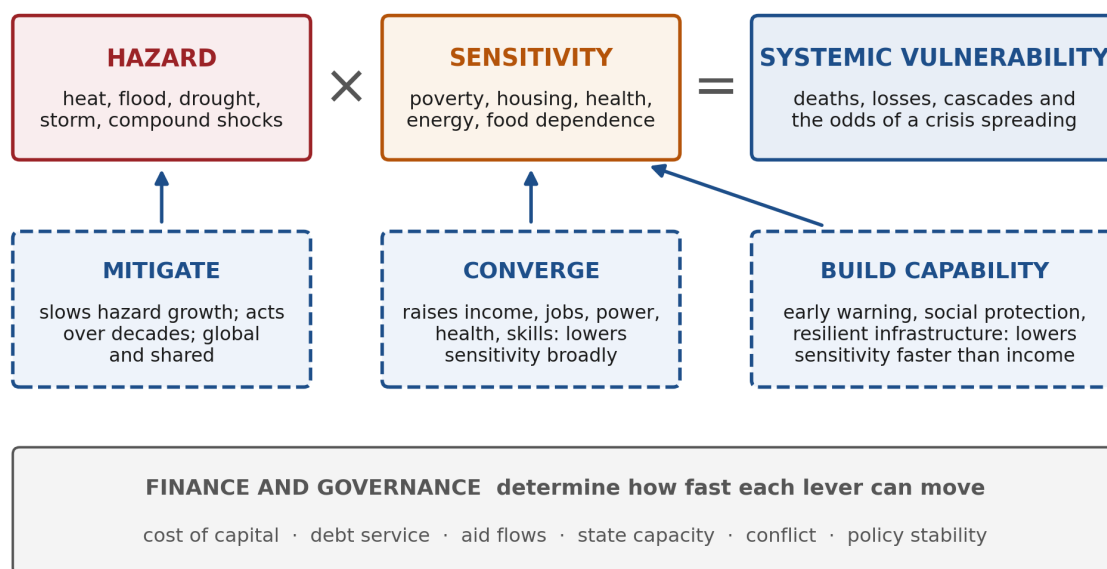


Figure 2. Systemic vulnerability as hazard times sensitivity, and the three levers that act on it.

Source: H Heuristics framework, drawing on the hazard, vulnerability and coping-capacity logic of the [INFORM Risk Index](#) and the vulnerability and readiness structure of the [ND-GAIN Country Index](#).

1.4 How the report is organised

Section 2 reviews the record of income convergence, shows the arithmetic of catching up and describes the stall of the 2020s. Section 3 defines systemic vulnerability, reviews how it is measured and sets out the evidence that development reduces it. Section 4 turns to the clock: warming, demography, the jobs challenge and the rising cost of disasters. Section 5 asks where convergence is stalling most, in poverty, power and protection, and Section 6 examines the financing squeeze and the 2026 shock. Section 7 maps vulnerability across seven regional archetypes. Section 8 identifies the accelerators that do double duty, raising incomes and cutting vulnerability together. Section 9 presents the race model, Section 10 the financing of the acceleration, Section 11 a sequenced roadmap, and Section 12 the objections and limits. Section 13 concludes. Appendices set out the model, the evidence grading and the sources.

1.5 Method, evidence and cautions

The report synthesises primary and authoritative secondary sources through October 2026, and every quantitative claim is linked inline. Figures are of three kinds, and each caption says which. Some report values from cited sources. Some are H Heuristics assessments on a stated scale. One family, the race-model figures in Section 9, is an illustrative calculation whose assumptions are disclosed in Appendix A. Where sources conflict or a figure is modelled rather than counted, the text says so. Several of the figures that anchor the argument, including disaster-mortality shares and heat-death totals, are exposure-response estimates, not registry counts.

Two cautions govern the whole report. First, the burdens described here overlap: a household can be poor, uncovered by social protection, without power and exposed to heat at once, and those counts must not be added. Second, the report is analytical rather than predictive. It contains no investment advice, and the model is an argument about orders of magnitude and about which levers matter, not a forecast. A third caution concerns the climate-economy literature itself. A widely cited 2024 estimate that the world is already committed to a [19 per cent income loss by mid-century](#) has since been retracted by its authors for revision and resubmission. This report therefore does not rest any conclusion on that figure, and treats macro-damage estimates as ranges with wide uncertainty.

2. The Convergence Record and Its Stall

Poor countries have been catching up, on average, for a quarter of a century. That fact is the foundation of any optimistic account. But the catch-up is uneven, it has been interrupted by the shocks of the 2020s, and the arithmetic of reaching middle-income status from where the poorest economies stand is unforgiving.

2.1 What the record shows

The standard reading of the late twentieth century was that poor countries did not converge unconditionally on rich ones. Only economies with good policies, human capital and institutions caught up. [Kremer, Willis and You](#) revisited that finding using the 25 years of data that followed. They found a trend towards unconditional convergence from 1990 and clear convergence from 2000, driven both by faster growth among poorer countries and by slower growth at the frontier. They also found that many of the correlates of growth, among them human capital, policy and institutions, had themselves converged in the direction associated with higher income. The poor world, on this evidence, became easier to grow in.

Sustained, rapid catch-up remains rare. The Commission on Growth and Development, in its [Growth Report](#), identified thirteen economies that grew at 7 per cent a year or more for 25 years or longer after 1950. They were varied in size, in resource endowment and in political system, but they shared high investment and saving, reliance on markets and leadership that built consensus around growth. The [World Development Report 2024](#) adds a sobering count. At the end of 2023 there were 108 middle-income countries, home to about 75 per cent of the world's people and two of every three people in extreme poverty. Only 34 economies had moved from middle to high income since 1990, and more than a third of those were helped by integration with the European Union or by newly found oil. Countries typically stall when their income reaches about 10 per cent of the United States level, roughly US\$8,000 a head.

2.2 The income ladder

The distance from the bottom of the ladder to the stalling point is large. The World Bank puts average GDP per person in low-income countries at [under US\\$700, about 1 per cent of the level in high-income economies](#). The middle-income band the Bank uses spans US\$1,136 to US\$13,845. The stalling point of about US\$8,000 therefore lies roughly eleven to twelve times above the low-income average. Figure 3 places these markers on a logarithmic scale. The ladder is long, and the first rungs are the slowest to climb because the poorest economies have the weakest savings, the least reliable power and the thinnest institutions.

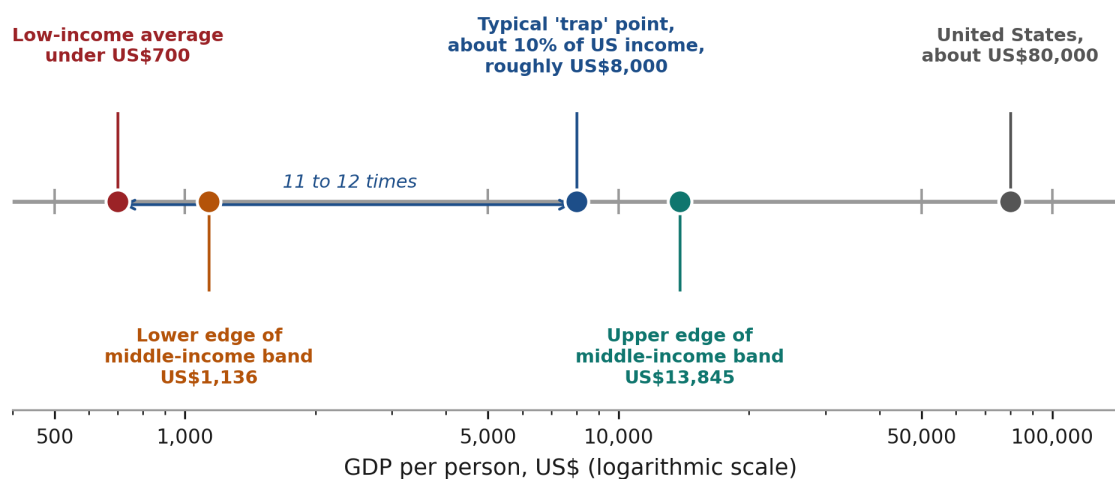


Figure 3. The income ladder: low-income average, middle-income band, the typical stalling point and the United States.

Source: [World Bank, Global Economic Prospects blog, January 2026](#) (low-income average); [World Development Report 2024](#) (band limits and the stalling point at about 10 per cent of US income). US value approximate.

2.3 The arithmetic of catching up

Compound growth makes the point precisely. Starting from US\$700, an economy needs $\ln(8,000/700)$ divided by $\ln(1 + g)$ years to reach US\$8,000. At 2 per cent a year that is 123 years; at 3 per cent, 82; at 4 per cent, 62; at 5 per cent, 50; at 6 per cent, 42; at 8 per cent, 32; and at 10 per cent, 26. To arrive by 2050, an economy would need to grow at about 10.7 per cent a year in per-person terms, every year, for 24 years. No economy has done that for a quarter of a century outside a few city-states and one or two special cases. Even a country matching the thirteen best performers of the Growth Report, at 7 per cent, would take 36 years and reach the stalling point in the early 2060s.

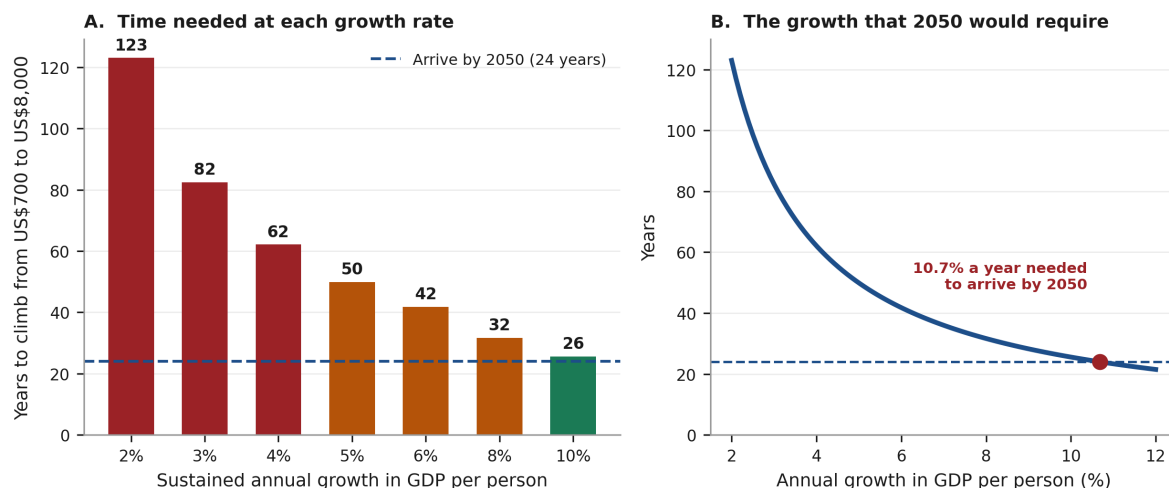


Figure 4. Years needed to climb from US\$700 to US\$8,000 a head at each growth rate, and the growth rate that arriving by 2050 would require.

Source: H Heuristics calculation from the compound-growth identity. Start and end values from the World Bank sources cited in Figure 3. Nominal US dollars, constant growth; illustrative of arithmetic, not a projection for any country.

Two conclusions follow. The first is that the poorest economies will not complete income convergence before the middle of the century under any plausible path, and so cannot rely on income alone to reduce their sensitivity to the shocks of 2040 to 2060. The second is more hopeful. Many of the buffers that cut sensitivity do not require a US\$8,000 income. Bangladesh built its cyclone preparedness system when its income was a small fraction of that level. Rwanda and Ethiopia, among others, are often cited for expanding community health coverage, vaccination and primary schooling well ahead of their income peers. The case for deliberate, front-loaded capability building rests on this gap between what income would eventually buy and what targeted policy can buy now.

2.4 The stall of the 2020s

The first years of the decade have not helped. The World Bank's [June 2026 Global Economic Prospects](#) attributes a sharp slowdown to the conflict in the Middle East, which has lifted energy prices, raised the cost of fertiliser and fuel and tightened financial conditions for borrowers. It projects global growth of about 2.5 per cent in 2026, the weakest pace outside a recession in nearly two decades, and warns that on present trends the 2020s could become a [lost decade](#) for the global economy. Per-person income growth in emerging and developing economies is the weakest since the pandemic. Because the Bank weights countries at market exchange rates, its headline figure is lower than the [IMF's October 2026 estimate of 3.1 per cent](#), which uses purchasing-power weights. The institutions agree on the shape: a split outlook in which revisions fall mainly on emerging and developing economies, and in which low-income and fragile economies carry the heaviest burden.

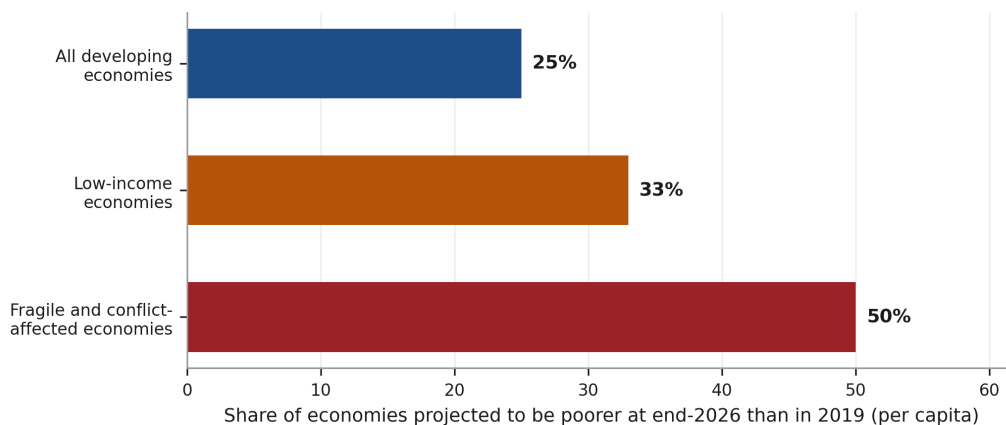


Figure 5. *Share of economies projected to end 2026 poorer, per person, than in 2019.*

Source: [World Bank, Global Economic Prospects, June 2026](#); [Fortune summary](#).

The pattern matters for the thesis. A shock that sets back a poor economy by several years does not merely delay convergence. It erodes the buffers that were supposed to reduce vulnerability: public budgets are diverted to subsidies and debt service, households sell assets, schooling is interrupted and maintenance of infrastructure is deferred. A fragile economy that is poorer in 2026 than in 2019 enters the next hazard season with thinner defences than it had seven years ago. This is the central dynamic that the model in Section 9 captures: vulnerability and growth are not independent, because the losses that vulnerability produces slow the growth that would have reduced it.

2.5 The industrialisation problem

A final feature of the record deserves mention because it affects both growth and vulnerability. Manufacturing historically absorbed the labour of poor economies and delivered rapid productivity gains. [Rodrik's work on premature deindustrialisation](#) shows that the relationship between industrialisation and income has shifted downwards, so that countries now reach their manufacturing peak at lower incomes than early industrialisers did, with the principal exceptions in Asia and among manufactured-goods exporters. For today's poorest economies this means the old route from farm to factory is narrower. They must find jobs in services, agriculture-linked processing, construction, energy and digital work, and these routes are slower and less certain. It also sharpens the jobs challenge described in Section 4, in which the World Bank expects 1.2 billion young people in the Global South to reach working age in the next decade against only about 420 million expected new jobs.

3. Systemic Vulnerability: Concept, Measurement and Evidence

Vulnerability is often used loosely. This section pins the concept down, shows how the main indices measure it, and reviews the evidence that development, and especially certain forms of development, lowers it. It also sets out what development does not do, because growth that adds people and assets to flood plains without adding buffers can raise vulnerability before it lowers it.

3.1 From hazard to systemic risk

A hazard becomes a disaster when it meets exposure and sensitivity. A flood in an empty valley is a hydrological event. The same flood in a valley with a settlement, a clinic and a bridge is a disaster whose size depends on how the buildings were built, whether the people were warned, whether the bridge has a diversion route, whether the families have savings or insurance and whether the government can pay. These conditions are what the term sensitivity covers in this report.

The word *systemic* adds a further claim: that vulnerability is not purely local. Shocks propagate through shared infrastructure, supply chains, public budgets and financial markets. A drought in a hydropower catchment becomes a blackout, then a loss of factory output, then a tax shortfall, then a debt-service problem. [Lawrence, Homer-Dixon and colleagues](#) describe this as crisis entanglement: crises in several systems become causally coupled so that their combined effect exceeds the sum of the parts. Zambia illustrates the pattern. A drought that dried the Kariba reservoir produced [power cuts of up to 21 hours a day](#) in 2024, cutting into mining output and household incomes in a country that was still emerging from a sovereign debt default. The hazard was a poor rainy season. The vulnerability was a power system with one dominant source and a government with no fiscal room.

3.2 How vulnerability is measured today

No single index captures the concept, but three families of measures are in regular use, and they agree broadly on which countries are most exposed. Table 1 summarises them. They differ in purpose: INFORM is built for humanitarian prioritisation, ND-GAIN for investors and development planners, and the disaster-loss databases for retrospective accounting.

Table 1. Principal ways of measuring vulnerability and their use in this report

Measure	What it captures	Strength	Limit	Use here
INFORM Risk Index	Hazard and exposure, vulnerability, and lack of coping capacity, combined by country	Open, global, updated each year; built for crisis prioritisation	Composite weights are judgemental; coarse at sub-national level	Archetype screening (Section 7)
ND-GAIN Country Index	Vulnerability and readiness to use investment, by country	Long time series; ties vulnerability to readiness	Slow to reflect shocks; proxy-based	Framework logic (Figure 2)
IPCC AR6 Working Group II	People living in contexts highly vulnerable to climate change	Authoritative synthesis; about 3.3 to 3.6 billion people	Qualitative classification; not a ranking	Scale of the exposed population
EM-DAT and OWID disaster records	Recorded disaster deaths and losses	Long record; replicable	Under-reporting in early decades and in poor countries	Mortality trend and income

Measure	What it captures	Strength	Limit	Use here
				gradient (Figure 6)
UNDRR Global Assessment Report 2025	Direct and cascading losses, financing and resilience returns	Counts hidden costs; ties to financing	Estimates are modelled	Loss scale (Figure 11)

Source: *H Heuristics review of the instruments cited. The indices are complements, not substitutes.*

These measures describe vulnerability as it is, and say little about how fast it can change. The rest of this section turns to that dynamic evidence.

3.3 The income gradient in disaster mortality

The cross-country evidence is consistent. Kahn's analysis found that disaster deaths fall with income and with better institutions after controlling for hazard exposure and geography. The CRED review, covering 1994 to 2013, found that lower-income countries accounted for 44 per cent of disasters but 68 per cent of deaths, and that the average disaster killed 332 people in a lower-income country against 105 in a higher-income one. The report concluded that levels of economic development, more than exposure to hazards, determine mortality. Figure 6 shows both results.

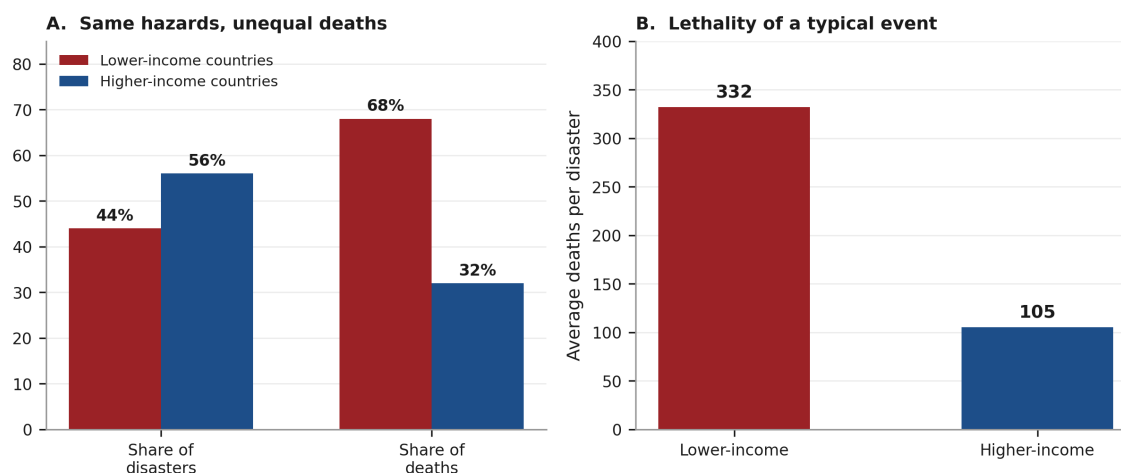


Figure 6. Disasters and deaths by income group, 1994 to 2013 (CRED review).

Source: [CRED, The Human Cost of Natural Disasters: A Global Perspective](#), based on EM-DAT records. Income-group split as defined in the report. The gradient is consistent with [Kahn \(2005\)](#).

The gradient is not a law. It reflects what rising income typically buys: sturdier housing, hospitals within reach, roads that stay open, institutions that can warn and evacuate. Where those were built early, deaths fell early. That is why case studies of countries that moved faster than their income are more useful for policy than the average.

3.4 Bangladesh and Odisha: vulnerability that fell faster than income

Bangladesh sits on the world's largest delta, with tens of millions of people living within a few metres of sea level, and is struck by severe cyclones almost every year. The 1970 Bhola cyclone killed at least 300,000 people. The 1991 cyclone killed [about 138,000](#). [Cyclone Sidr in 2007](#), a storm of comparable strength, killed 3,363. When Cyclone Amphan struck in 2020, around 2.4 million people were moved into more than

12,000 shelters and deaths in Bangladesh were about [two dozen](#). The turnaround rested on a [volunteer-based Cyclone Preparedness Programme](#), a national network of multipurpose shelters, better forecasting and the spread of mobile phones, and it happened while Bangladesh was still a low-income and then lower-middle-income country.

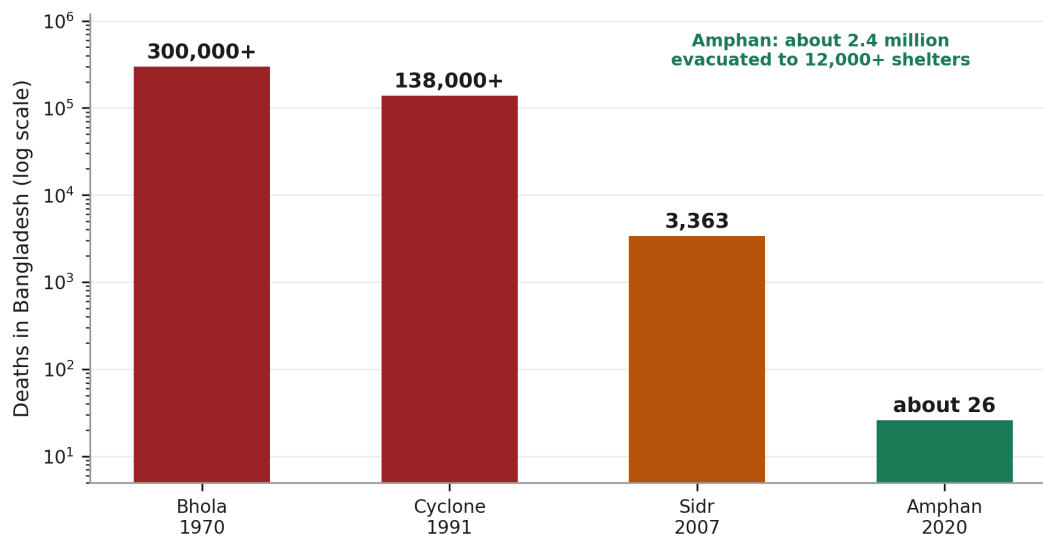


Figure 7. Cyclone deaths in Bangladesh, 1970 to 2020, on a logarithmic scale.

Source: [TBS News](#) (1970, 1991); [Dhaka Tribune](#) (Sidr); [American Red Cross](#) (Amphan, about two dozen). 1970 and 1991 are lower bounds; the bar for 2020 shows the approximate count.

Odisha in India followed a similar path. The 1999 super cyclone killed about 10,000 people. The state then built hundreds of multipurpose shelters and a village-level warning network, and when Cyclone Phailin of comparable strength struck in 2013, [almost a million people spent the night in shelters](#) and deaths numbered a few dozen at most. In both cases the decisive investments were modest relative to the lives saved and were made by governments of states that were poor by national and global standards. They are examples of convergence in capability running well ahead of convergence in income.

3.5 What development does not do automatically

Development lowers vulnerability on average, but three qualifications keep the claim honest. First, growth can raise exposure before it lowers sensitivity. Fast urbanisation puts more people and assets on flood plains, coasts and informal land, and buildings often rise faster than building codes are enforced. [Pakistan's 2022 floods](#), which affected 33 million people, hit a middle-income economy whose income per head was far above Bangladesh's in 1991. Second, small and concentrated economies can lose a very large share of income in a single event. [Hurricane Maria](#) produced damage in Dominica equal to 226 per cent of the previous year's GDP. Growth does not protect against that without pre-arranged risk financing. Third, the benefits of development are not evenly shared. Poor households in informal settlements often see little of the improvement in national averages, and the World Bank's [Unbreakable](#) analysis shows that a given loss does far more damage to the well-being of the poor than the rich.

The implication is that the form of development matters as much as its speed. Growth that comes with building-code enforcement, risk-informed land use, social protection and reliable public services lowers vulnerability. Growth without them can leave it unchanged or higher. That is why this report distinguishes

the growth lever from the capability lever in the model, and why it treats them as complements rather than as substitutes.

4. The Clock: Hazards, Demography and the Closing Window

Convergence would be a long-run project at any time. What makes it urgent is that several of the forces that raise vulnerability are on known schedules. Warming is locked in for decades, the populations of the most exposed regions are still growing, the labour force of the Global South is about to expand by more than a billion, and the bill for disasters is rising. Together they define a window of roughly twenty years in which the margin for error narrows sharply.

4.1 A hotter baseline with a long tail

The World Meteorological Organization reports that [2025 was one of the three warmest years on record, about 1.43 °C above the 1850 to 1900 average](#), and that the eleven warmest years in the instrumental record are the eleven most recent. UNEP's [Emissions Gap Report 2025](#) finds that full implementation of current national pledges would lead to 2.3 to 2.5 °C of warming by 2100, current policies to about 2.8 °C, and that only the fulfilment of every net-zero pledge would bring the figure down to about 1.9 °C. Reductions of 35 and 55 per cent against 2019 levels would be needed by 2035 to align with 2 °C and 1.5 °C pathways. The report judges a temporary overshoot of 1.5 °C very likely within the next decade.

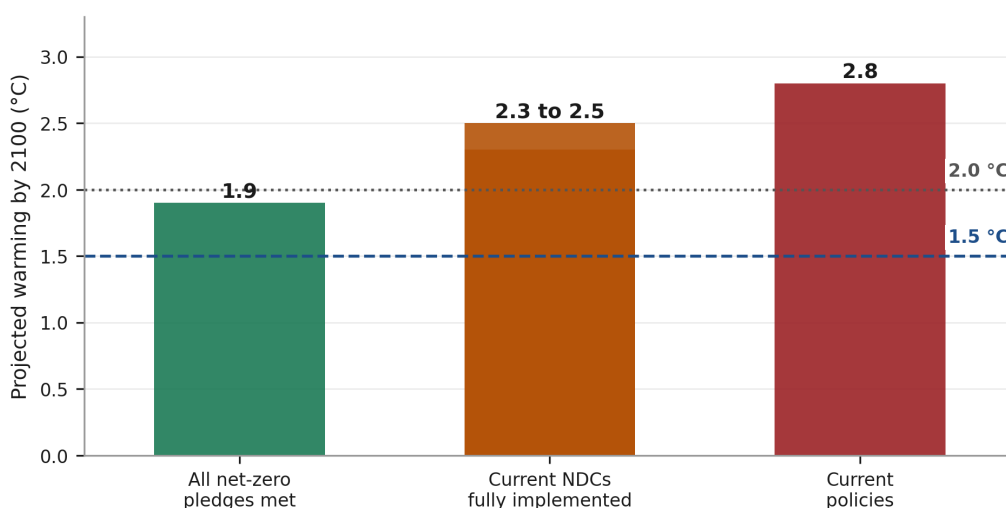


Figure 8. Projected warming by 2100 under three policy assumptions.

Source: [UNEP, Emissions Gap Report 2025](#). Ranges are the central estimates reported in the 2025 report; the NDC bar shows the 2.3 to 2.5 °C range.

Beyond the central projections lie the non-linear risks. The 2025 update to the planetary boundaries framework found that [seven of nine boundaries are now transgressed](#), and the [Global Tipping Points Report 2025](#) concluded that warm-water coral reefs have already passed their tipping point. None of these changes arrives on a single date. They raise the baseline against which every vulnerable community must be defended, and they raise it most in the low latitudes where many of the poorest people live. Earlier empirical work, including [Dell, Jones and Olken](#) and [Burke, Hsiang and Miguel](#), found that higher temperatures depress growth in poor countries in particular, a result that links the hazard curve directly to the convergence curve.

4.2 Heat as a labour and health shock

Heat is the clearest example of a hazard that falls hardest on the poor and works through income as much as through mortality. The 2025 report of the [Lancet Countdown](#) estimates that heat-related deaths average about 546,000 a year (2012 to 2021) and that, between 2020 and 2024, [84 per cent of the heatwave days people experienced would not have occurred without climate change](#). It also estimates that heat cost a record 639 billion potential labour hours in 2024, with income losses equal to about [US\\$1.09 trillion, close to 1 per cent of world GDP](#), with the heaviest impact on low- and middle-income countries. The International Labour Organization estimates that [2.41 billion workers, about 71 per cent of the global workforce, were exposed to excessive heat in 2024](#), with exposure highest in Africa (92.9 per cent), the Arab States (83.6) and Asia and the Pacific (74.7).

These figures matter for convergence because the people most exposed are outdoor and informal workers whose daily income depends on being able to work. A heat shock lowers both their output and their ability to save, and the lost savings are what a household would have drawn on in the next flood or crop failure. Heat, in other words, is a vulnerability amplifier: it takes the same income gap and widens the sensitivity gap behind it.

4.3 Population: the largest increases are where capacity is thinnest

The [UN's 2024 population projections, as summarised by Pew](#), put Africa's population at about 1.5 billion today and about 3.8 billion by 2100 in the medium variant, with a range from 2.7 billion in the low variant to 5.2 billion in the high one. Africa's share of the world's people would rise from about 18 per cent to about 37 per cent. Fertility is projected to fall from about 3.9 births per woman to 2.8 by 2050 and 2.0 by 2100, but the population momentum from a young age structure means that growth continues for decades. By 2100, twelve of the world's 25 most populous countries are projected to be African, against six today.

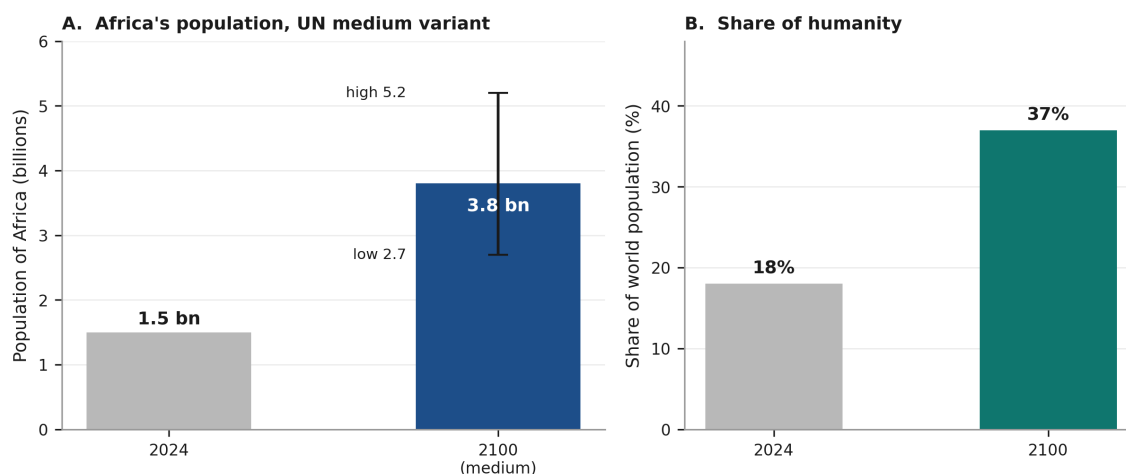


Figure 9. Africa's population and share of humanity, 2024 and 2100 (UN medium variant).

Source: [Pew Research Center, May 2026](#), summarising the [UN World Population Prospects 2024](#). Error bar shows the UN low and high variants.

The significance for vulnerability is arithmetic. If the number of people grows by 40 per cent in a generation, vulnerability per person must fall by 29 per cent merely to keep the total burden constant. Population growth already absorbs most of the gains in infrastructure. The 2026 [Tracking SDG7 report](#) notes that, in about three-quarters of African countries, more people now lack clean cooking than in 2010, because progress

has not kept pace with population. The model in Section 9 builds this effect in explicitly by reporting a population-weighted burden alongside vulnerability per person.

4.4 The jobs challenge

The same demographic momentum creates a labour-market problem. The World Bank has stated that over the next ten years [1.2 billion young people in the Global South will reach working age, while the market is expected to create only about 420 million jobs](#), leaving a shortfall that the Bank's president has put at nearly 800 million. Jobs matter to vulnerability because they are the main route by which households build savings and buffers. They matter to stability because large cohorts of young people without work or prospects increase the risk of conflict, migration and political volatility, which are themselves amplifiers of disaster risk.

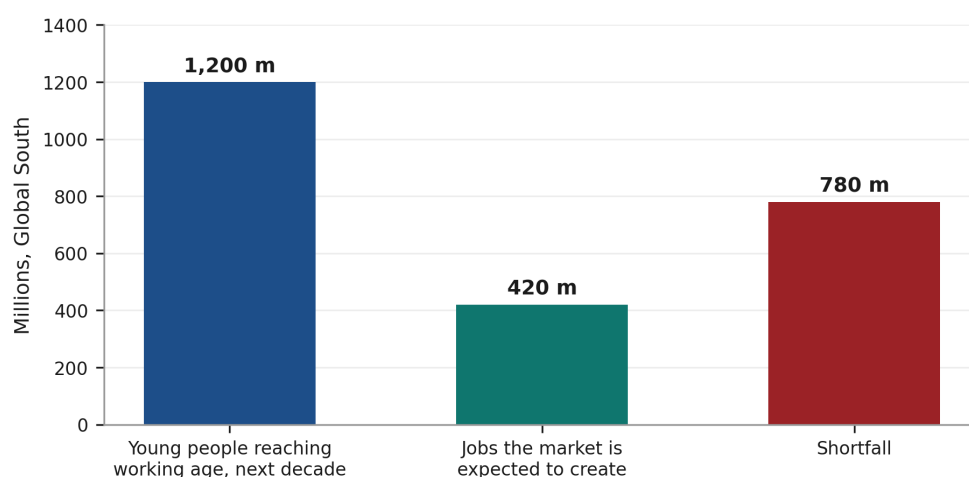


Figure 10. The jobs gap in the Global South over the next decade.

Source: [World Bank Group, August 2024](#). Shortfall is the difference between new working-age entrants and expected job creation; rounded.

4.5 The rising cost of disasters

UNDRR's [Global Assessment Report 2025](#), titled *Resilience Pays*, finds that recorded direct disaster losses rose from about US\$70 to 80 billion a year over 1970 to 2000 to US\$180 to 200 billion a year over 2001 to 2020, and that once cascading and ecosystem effects are counted the true annual cost approaches US\$2.3 trillion, nearly ten times the recorded figure. The burden, [UNDRR notes](#), falls disproportionately on developing countries and, through debt, feeds back into their capacity to prepare. The World Bank's [Unbreakable](#) analysis, which measures losses in terms of lost well-being rather than lost assets, puts the annual figure for the poor much higher relative to income than for the rich, because a dollar of loss means more to a household that has little.

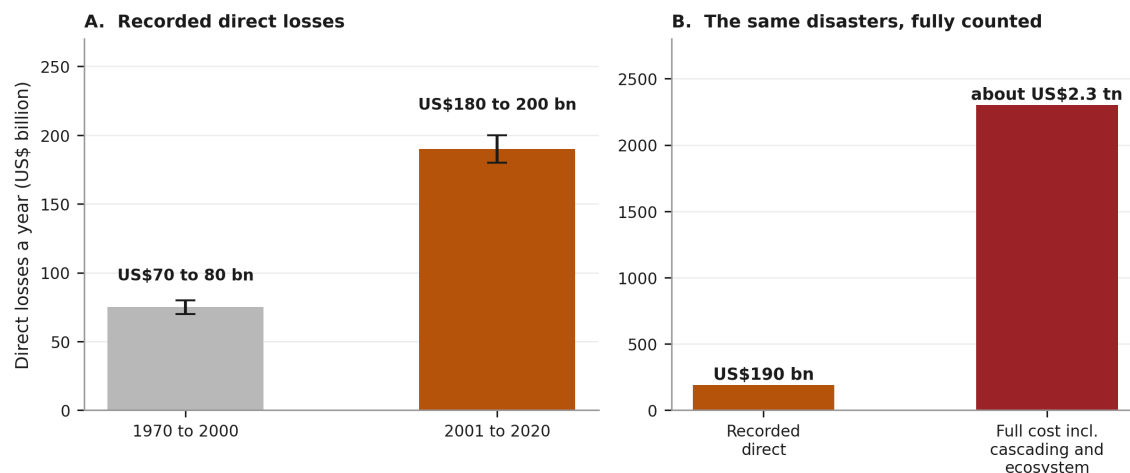


Figure 11. Disaster losses: recorded direct losses by period, and the full cost once cascading and ecosystem effects are counted.

Source: [UNDRR, Global Assessment Report 2025](#). Panel B compares the midpoint of recorded direct losses for 2001 to 2020 with UNDRR's estimate of the full annual cost; the figures are modelled estimates.

4.6 Why the window is the right frame

Taken together, these trends define the timetable. Hazard intensity keeps rising through the century. The dependent population in the most exposed regions grows for the next several decades. The labour force expands by more than a billion in ten years. And the cost of disasters, measured fully, is already a meaningful fraction of the annual income of the poorest economies. The overlap of these curves in the middle of the century is what the Danger Window names. Two features of the window shape the policy response. First, stress is cumulative, so shocks arriving after capacity has been eroded cause disproportionate damage. Second, the cost of capacity rises in a crisis: materials, skilled labour and credit are dearest when many countries try to build at once. These features are the economic case for acting in the second half of the 2020s and the 2030s rather than in the 2040s.

5. Where Convergence Is Stalling: People, Poverty and the Power Gap

The evidence in this section points to a common geography. The gaps in income, electricity and social protection are widest in the same places, and those places are also where the hazard is growing fastest. Poverty has become a problem of Sub-Saharan Africa and of fragile states; electricity access is stalling because population growth outruns connections; and the great majority of people in the most climate-exposed countries have no social protection at all.

5.1 Poverty is concentrating in fragile Africa

Under the World Bank's [updated global poverty lines](#), extreme poverty is measured at US\$3.00 a day. On that line about 808 million people, 9.9 per cent of humanity, are projected to live in extreme poverty in 2025, and about 73 per cent of them are in Sub-Saharan Africa, up from about 69 per cent previously. A companion analysis on the Bank's [Development for Peace blog](#) estimates that the extreme poor in fragile and conflict-affected situations reached 415 million in 2024, the first time more of them lived in such places than elsewhere, and projects that about 436 million of the world's 757 million extreme poor will live in fragile states by 2030. Nigeria and the Democratic Republic of the Congo together will account for a large part of the total. The Bank has judged that the goal of ending extreme poverty by 2030 is out of reach.

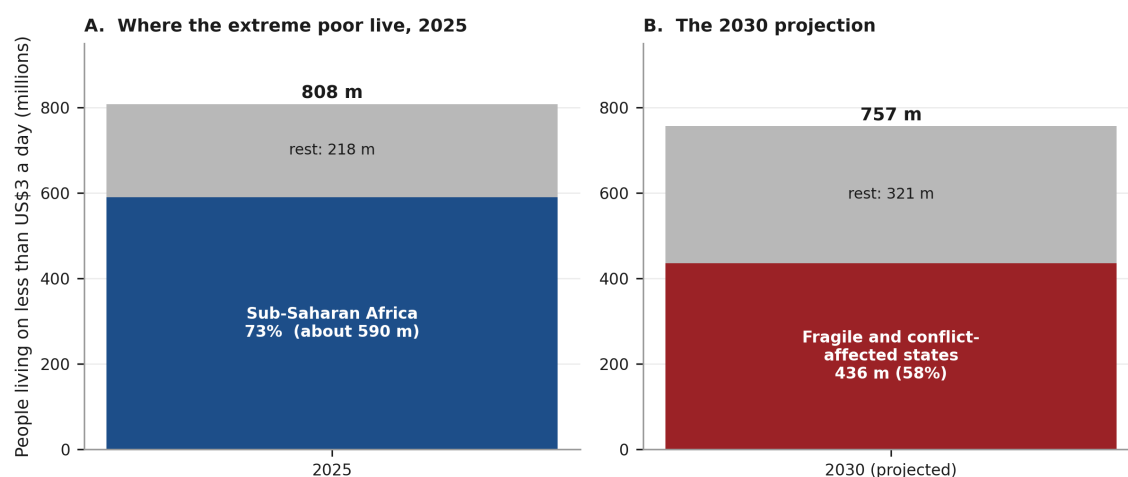


Figure 12. Where the extreme poor live: Sub-Saharan Africa in 2025 and fragile and conflict-affected states in 2030.

Source: [World Bank, June 2025 update to global poverty lines](#) (808 million; 73 per cent); [World Bank Development for Peace blog](#) (436 of 757 million). Poverty line US\$3.00 a day, 2021 prices. Panel A applies the 73 per cent share to the projected total.

Poverty on this scale is a vulnerability multiplier. People below US\$3 a day have no buffer to absorb a price shock, a lost harvest or a medical bill, and they live in the worst-built housing in the most hazard-prone locations. Food insecurity shows the same pattern: the FAO's 2026 State of Food Security report counts [645 million people, 7.8 per cent of the world, as chronically hungry](#), with Africa's prevalence about 20 per cent. The learning crisis compounds this. [Seven in ten ten-year-olds in low- and middle-income countries could not read and understand a simple text](#) in the Bank's 2022 assessment, which limits the productivity of the next generation of workers.

5.2 Power: connections are rising but population is rising faster

Electricity is the most important single enabler of capability. It keeps clinics and vaccine fridges running, pumps water, charges the phones that carry warnings and mobile money, powers cooling and cold chains and lets firms operate. The 2026 edition of [Tracking SDG7](#) found that the number of people without electricity fell by only 11.5 million in 2024, to 655 million, because population growth absorbed most of the gains. Sub-Saharan Africa, with more than 560 million people unconnected, needs to triple its pace of electrification to reach universal access by 2030. About 2 billion people worldwide still lack clean cooking.

The most ambitious response is [Mission 300](#), a joint effort of the World Bank and the African Development Bank to connect 300 million Africans to power by 2030. By the October 2026 annual meetings it had reached about 64 million, roughly a fifth of the goal, [at nearly twice the pace recorded when it began](#), with 30 national compacts signed and nearly US\$15 billion committed. The ratio of progress to time elapsed is encouraging, but the 2030 target requires roughly 59 million connections a year from here, roughly twice the pace achieved so far. The underlying constraint is capital: [Africa receives about 2 per cent of global clean energy investment while holding a fifth of the world's population](#).

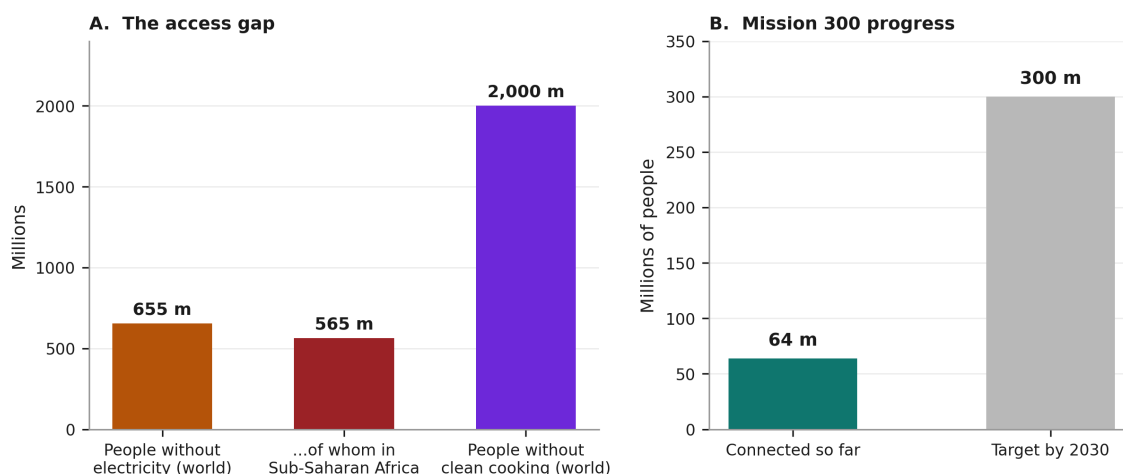


Figure 13. The access gap in electricity and clean cooking, and Mission 300 progress.

Source: [Tracking SDG7 2026](#) (655 million; about 2 billion; Sub-Saharan Africa 565 million in 2023); [Mission 300 progress, October 2026](#) (about 64 million of 300 million).

5.3 Protection: most of the exposed have no cushion

Social protection is the buffer that converts a shock into a dip rather than a descent. The International Labour Organization reports that [52.4 per cent of the world's people are now covered by at least one social protection benefit](#), the first time the majority has been reached, up from 42.8 per cent in 2015. But 3.8 billion people, mostly in the Global South, remain without any. The [Trade Union Confederation's reading of the report](#) notes that coverage in low-income countries has been stuck at about 9.7 per cent since 2017, and that in the twenty countries most at risk from climate change, 91.3 per cent of people, some 364 million, have no coverage. At the current pace, universal coverage would take until 2073.

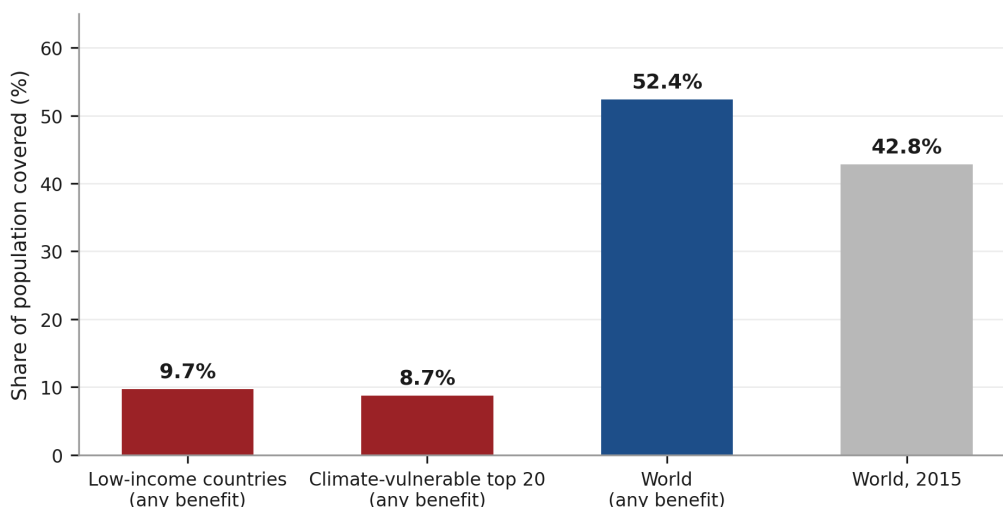


Figure 14. Social protection coverage: the most climate-vulnerable countries have almost none.

Source: [ILO, World Social Protection Report 2024 to 2026: ITUC summary](#) for the low-income and top-20 climate-vulnerable figures (top-20 covered share is 100 minus the 91.3 per cent uncovered).

The significance for the race is direct. Cash that arrives before or immediately after a shock keeps households from selling productive assets, pulling children from school or cutting food intake. The World Bank's Unbreakable analysis found that adaptive social protection and similar resilience measures could cut well-being losses by about a fifth. Where coverage is 9.7 per cent, those measures have almost nothing to build on, and the first priority in the most vulnerable economies is to build the registries, payment rails and delivery capacity that make shock-responsive transfers possible.

5.4 A common geography

The three gaps overlap. The fragile states of the Sahel, the Horn and Central Africa have the highest poverty, the lowest electrification and the thinnest social protection, and they face rapid hazard growth in the form of heat, drought and flood. South Asia's plains and deltas have lower poverty rates but very high exposure, with large populations at risk from heat, floods and cyclones. Small islands and coastal states have high income in some cases but very high fiscal and physical exposure. This overlap is the motivation for the archetype assessment in Section 7, and for the claim that a small number of places account for a disproportionate share of the vulnerability to be reduced.

6. The Financing Squeeze and the 2026 Shock

The case for accelerating convergence strengthens as the hazard curve rises, but the money moves the other way. Aid has fallen sharply, interest bills are crowding out health and education, adaptation finance is a small fraction of need, and a new energy and fertiliser shock in 2026 has hit import-dependent economies at the moment their buffers were thinnest.

6.1 Aid is in retreat

The OECD's preliminary data, published in April 2026, show that official development assistance from members of the Development Assistance Committee [fell by about 23 per cent in real terms in 2025](#), from US\$215.1 billion to US\$174.3 billion, or from 0.34 to 0.26 per cent of donors' combined national income. The United States, whose aid fell 56.9 per cent, accounted for most of the decline, and the five largest providers together accounted for 95.7 per cent of it. Bilateral aid fell 26.4 per cent and humanitarian aid 35.8 per cent. Only four countries, Denmark, Luxembourg, Norway and Sweden, exceeded the UN's 0.7 per cent target. Germany became the largest donor for the first time. The OECD's Secretary-General linked the cuts to fiscal pressure across donor governments and to the effects of the Middle East conflict.

6.2 Debt and the cost of capital

The second pressure is the cost of money. UNCTAD's [A World of Debt](#) reports that 3.4 billion people live in countries that spend more on interest than on health or education, up from 3.3 billion a year earlier, covering 61 countries against 54, with global public debt at a record of about US\$102 trillion in 2024. For a government in that position, building a shelter network, a cash-transfer system or a substation competes directly with servicing creditors.

Capital is also dearer for the private projects that deliver convergence. The IEA's [Reducing the Cost of Capital](#) found that other emerging and developing economies, those outside China, receive under 15 per cent of global clean energy investment, that the cost of capital for renewable projects there is at least double that in advanced economies, and that narrowing the gap by one percentage point would save about US\$150 billion a year in financing costs. The [V20 group of climate-vulnerable economies](#) has documented how climate vulnerability itself raises borrowing costs, producing a loop in which exposure to hazards makes the capital to reduce exposure more expensive.

6.3 The adaptation finance gap

UNEP's [Adaptation Gap Report 2025](#) estimates that developing countries will need about US\$310 billion a year for adaptation by 2035, rising to US\$365 billion on the basis of their own national plans. International public adaptation finance was US\$26 billion in 2023, down from US\$28 billion the year before, a gap of 12 to 14 times. The Glasgow target of doubling adaptation finance from 2019 levels by 2025 is on course to be missed. At [COP30 in Belém](#), parties agreed to call for at least tripling adaptation finance by 2035, a commitment that is non-binding and that critics noted lacks a baseline year. A large share of it, by one account about 58 per cent, reaches developing countries as debt rather than grants, which adds to the interest burden just described.

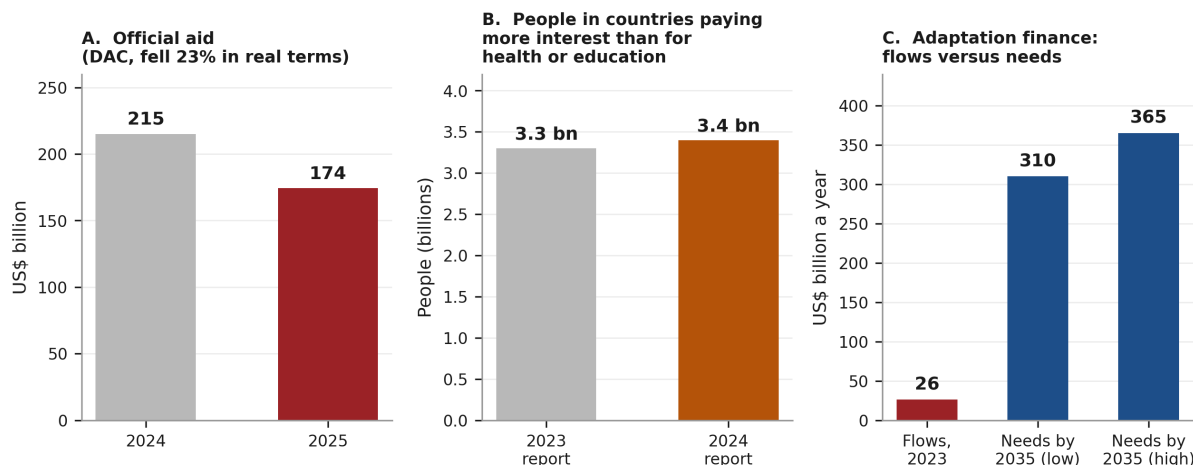


Figure 15. The financing squeeze: aid, debt service and adaptation finance.

Source: [OECD, April 2026](#) (aid, current US\$ billions; 23 per cent decline is in real terms); [UNCTAD, A World of Debt; UNEP Adaptation Gap Report 2025](#). Panel B uses the 2023 and 2024 editions of the UNCTAD report.

6.4 The Sevilla agenda and what it has not yet delivered

The international system has begun to respond. The [Fourth International Conference on Financing for Development](#), held in Seville in mid-2025, adopted a commitment of more than 100 policy actions, including a call to expand the lending capacity of the multilateral development banks (with an ambition, opposed by the United States, to triple their lending), a debt facility to lower borrowing costs, a global debt registry and debt pause clauses. The United States did not join the consensus. The commitments remain largely on paper, and the retreat of bilateral aid shows how quickly the financing picture can move against vulnerable economies even as multilateral frameworks are agreed.

6.5 The 2026 shock as a live test

The conflict in the Middle East that has disrupted energy supply during 2026 has become a real-time test of the thesis. The World Bank's April 2026 Commodity Markets Outlook projected [energy prices up about 24 per cent](#) over the year, the highest level since Russia's invasion of Ukraine, with fertiliser prices up 31 per cent and urea up 60 per cent. The IMF, World Bank and WFP issued a [joint warning](#) that the heaviest burden would fall on import-dependent economies with little fiscal room, and WFP estimated that up to 45 million more people could fall into acute food insecurity if the conflict continued. The World Bank's chief economist described the transmission in stages: first energy, then food, then inflation, and, for indebted economies, a worsening of already heavy debt-service burdens. The IMF's October meetings produced a call for members to [stock up funds for low-income vulnerable states](#).

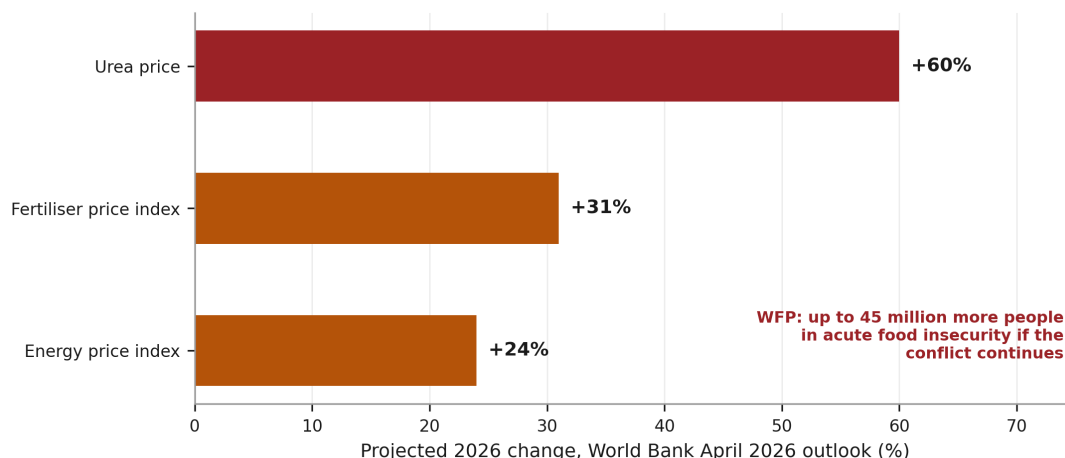


Figure 16. The 2026 input-price shock: projected rises in energy, fertiliser and urea prices.

Source: [World Bank Commodity Markets Outlook, April 2026](#) (via Kitco); [IMF, World Bank and WFP joint warning](#). Projections made in April 2026; outcomes depend on the conflict's course.

The episode illustrates the mechanism the report is concerned with. A shock whose origin is far from the vulnerable economies, a disruption to oil and fertiliser supply, arrives through import bills, food prices, currency pressure and the fiscal budget. The economies that are hit hardest are those that import most of their fuel and fertiliser, have the least diversified power supply, hold the least foreign exchange and have the least social protection. Reduced dependence on imported fuel through domestic solar and storage, on imported fertiliser through soil and nutrient management, and on volatile food imports through local storage and productivity is therefore both a convergence measure and a vulnerability measure, a point developed in Section 8.

6.6 What the squeeze implies

Three implications run through the rest of the report. First, the sequencing of finance matters more than its headline size: capital that arrives early, cheaply and in the form of grants or concessional loans has outsized effects when governments are at the edge of their fiscal limits. Second, the cheapest sources of acceleration are those that raise income and cut vulnerability together and need little new money, such as removing regulatory barriers to distributed solar, improving procurement and building registries. Third, the case for risk-pooling and contingent finance rises with the number of shocks, because it allows governments to respond without borrowing at crisis rates. Section 10 returns to each.

7. The Geography of Vulnerability: Seven Archetypes

Averages hide the places where the race will be won or lost. This section groups the most exposed economies into seven archetypes defined by the combination of hazard, sensitivity, fiscal position and institutional capacity, and assesses each on a common scale. The purpose is not to rank countries but to show that the work of convergence differs by place, and that a small number of archetypes account for most of the vulnerability that could be reduced.

7.1 How the archetypes are built

The archetypes group countries that share a dominant mix of exposures and constraints. They are derived by H Heuristics from the evidence in Sections 3 to 6 and from the structure of the [INFORM Risk Index](#), which separates hazard and exposure, vulnerability and coping capacity, and the [ND-GAIN Country Index](#), which separates vulnerability from readiness. Each archetype is scored from 1 (smaller gap) to 5 (larger gap) on five dimensions: how fast hazards are growing, how sensitive households and systems are to them, how stressed public finances and debt are, how large the institutional capacity gap is, and how far convergence momentum lags what is needed. The scores are judgements on a stated scale, informed by the sources cited elsewhere in the report, and they should be read as an organised way of thinking, not as measurements.

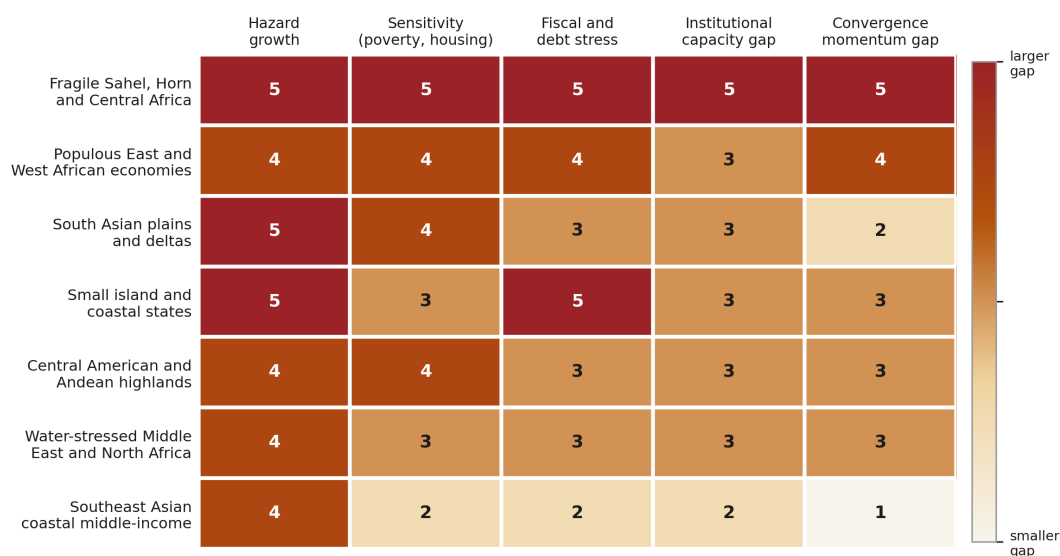


Figure 17. Seven vulnerability archetypes assessed on five dimensions (1 = smaller gap, 5 = larger gap).

Source: H Heuristics structured assessment, informed by the evidence in Sections 3 to 6. Scores are judgements on a 1 to 5 scale and are not derived from a single dataset; archetypes group countries with a shared mix of constraints and are not exhaustive.

7.2 Reading the map

Table 2. The seven archetypes: examples, dominant exposures and what convergence-before-crisis means for each

Archetype	Illustrative countries	Dominant exposures	Convergence priority
1. Fragile Sahel, Horn and Central Africa	Mali, Niger, Chad, Sudan, South Sudan, Somalia, DRC	Drought, heat, conflict, displacement, hunger; weak state reach; very low electrification	Humanitarian-development bridging; cash and early warning

Archetype	Illustrative countries	Dominant exposures	Convergence priority
			first; protect basic service delivery; build the state's ability to deliver
2. Populous East and West African economies	Nigeria, Ethiopia, Kenya, Tanzania, Ghana, Côte d'Ivoire	Floods, drought, heat; rapid population growth; debt stress; large jobs gap	Scale power and connectivity; jobs; city planning ahead of growth; lower cost of capital
3. South Asian plains and deltas	Bangladesh, Pakistan, India's Indo-Gangetic states, Nepal	Humid heat, floods, cyclones, air pollution; dense populations; informal work	Heat-health plans; flood-proof infrastructure; extend protection to informal workers; keep the cyclone model sustained
4. Small island and coastal states	Caribbean, Pacific and Indian Ocean islands	Cyclones, sea-level rise, import dependence; debt; very high loss-to-GDP ratios	Pre-arranged risk finance; resilient energy; debt-for-resilience swaps; regional pooling
5. Central American and Andean highlands	Guatemala, Honduras, Bolivia, Peru	Dry-corridor drought, storms, landslides; smallholder dependence; migration pressure	Climate-smart agriculture; anticipatory cash; rural roads and water storage
6. Water-stressed Middle East and North Africa	Egypt, Iraq, Yemen, Jordan, Morocco	Water scarcity, extreme heat, import dependence; energy-price exposure; conflict in places	Water efficiency and reuse; solar-plus-storage; food-import buffers; regional cooperation
7. Southeast Asian coastal middle-income	Philippines, Vietnam, Indonesia, Thailand	Typhoons, coastal flooding, heat; fast urbanisation; relatively strong institutions	Enforce codes and land-use rules; protect gains from stalling; use as a source of replicable practice

Source: H Heuristics assessment. Countries are illustrative of each archetype's mix and are not a complete classification; some countries fit more than one archetype.

Three patterns stand out. First, archetype 1 scores at the top of every dimension: it has the fastest growing hazards, the highest sensitivity, the heaviest fiscal strain, the thinnest institutions and the weakest momentum. Convergence in these places will not look like convergence elsewhere. It starts from the ability of the state to function at all, and the priority is to protect and build the delivery systems, health posts, payment rails and warning networks that can survive conflict and fiscal stress. Second, archetypes 2 and 3 contain the largest populations and therefore the largest numbers of people to be reached. Success or failure in a few large economies, such as Nigeria, Ethiopia, Pakistan and Bangladesh, moves the aggregate more than anywhere else. Third, archetype 7 scores lowest on sensitivity and institutions and shows what progress looks like. Its economies are not safe, but they have built enough capacity that typhoon and flood losses are manageable and the risk is of stalling rather than of collapse.

7.3 Why the archetypes matter for policy

The archetypes bring out two policy points. One is that the sequence of investments differs. In archetype 1, the first dollar is better spent on a warning and cash system than on a grid, because the state cannot yet maintain a grid. In archetype 2, the first dollar is better spent on power and jobs, because the hazard exposure is high but the state can deliver. In archetype 4, the first dollar goes to risk finance because a single storm can erase a year of income. The other is that the relevant international partners differ. Archetype 1 needs humanitarian and development actors working together and accepting higher risk. Archetype 2 needs capital at lower cost and regional integration. Archetype 4 needs access to concessional finance and pooled insurance. A strategy of convergence before crisis is a family of strategies, not a single programme.

8. The Accelerators: Seven Levers That Do Double Duty

Many development measures raise income. Many resilience measures cut vulnerability. A few do both at once, quickly, and at costs that can be met even when budgets are tight. This section identifies seven of them, reviews the evidence for each and sets out what has to be true for them to work.

8.1 Selection criteria

A lever earns a place on the list if it passes four tests. It must raise income or productivity within a decade, so that it contributes to convergence in the ordinary sense. It must cut sensitivity to shocks, so that it contributes to convergence in capability. It must be deliverable at scale within five to ten years in a typical low- or lower-middle-income setting. And it must have evidence of returns that does not rest on a single study. The list is not exhaustive, and the report is explicit that the first test excludes some valuable measures, such as long-term ecosystem restoration, whose benefits arrive later.

8.2 The seven levers

Lever 1: Reliable, clean, distributed power

Electricity raises productivity in nearly every sector and underpins most other buffers. It also cuts a specific kind of vulnerability: dependence on imported fuel. Africa holds about [60 per cent of the world's best solar resources](#), and the combination of cheap panels, falling battery prices and mini-grid models has made distributed supply the fastest route to connection in sparsely populated areas. The logic is straightforward, and the 2026 shock illustrates it: economies that depend on imported diesel and heavy fuel oil are exposed to every price spike, while those with more domestic solar, hydro and storage are exposed to less of it. The binding constraints are the cost of capital, the quality of utilities and the ability to pay for service, and [Mission 300](#) is the main vehicle for addressing them.

Lever 2: Early warning and climate information

Warning systems are the cheapest known way to cut disaster deaths. The UN's [Early Warnings for All](#) initiative aims to cover everyone on earth by the end of 2027, and the [WMO and UNDRR's progress report](#) shows that coverage has risen but that critical gaps remain, especially in the last mile and in the least developed countries and small islands. The Global Commission on Adaptation reported a benefit-cost ratio of about 9 to 1 for early warning, and the often-quoted claim that [24 hours' notice can cut damage by 30 per cent](#). A [PreventionWeb review](#) found that such figures rest on modelled estimates and old case studies and should be treated as indicative, but the direction of the evidence, from Bangladesh and Odisha to the recent record of storm and flood fatalities, is strong. Warning also raises income indirectly, because farmers who receive reliable seasonal forecasts plant and invest differently.

Lever 3: Shock-responsive social protection and digital payments

A cash transfer that arrives within days of a flood or drought does what no infrastructure can: it stops the household from liquidating its future. [Anticipatory cash transfers](#), triggered by a forecast before the shock, are a newer form with encouraging evidence. The delivery system matters more than the transfer: a national registry, a payment rail and a trigger mechanism are the infrastructure of resilience, and mobile money and digital public infrastructure have made them far cheaper to build than a decade ago. With coverage in low-

income countries at under 10 per cent, the largest gains come from establishing the basic system, not from raising benefit levels.

Lever 4: Resilient infrastructure and building codes

Infrastructure built to withstand the hazards of its lifetime costs somewhat more at the start and far less over the asset's life. The World Bank's [Lifelines](#) study estimated large net benefits from more resilient infrastructure in low- and middle-income countries, and US evidence from the National Institute of Building Sciences found that [adopting modern building codes saves about US\\$11 for each US\\$1 invested](#), with other measures returning about US\$4 to US\$6. The dual benefit is clear: roads that stay open keep markets connected, and power lines that stay up keep factories running. The risk, as Pakistan's 2022 floods showed, is to build for the average year and not for the tail.

Lever 5: Agricultural productivity and food-system buffers

Farming remains the main source of livelihood for the poorest households, and it is where heat, drought and price shocks do the most damage. Improved seed, better soil nutrition, small-scale irrigation, solar-powered pumping and cold chains raise income and cut exposure at once. The 2026 fertiliser shock, with urea prices projected to jump by about 60 per cent, makes the case for efficient nutrient use, soil health and local production. Food-system buffers, from village-level storage to strategic reserves, reduce the pass-through of global price spikes to hunger. [Hunger now affects about 645 million people](#), and most of them are producers, so productivity and resilience on the farm are the quickest ways to cut it.

Lever 6: Health, heat protection and human capital

Healthy, educated workers earn more and absorb shocks better. Specific measures are cheap and well evidenced. A heat-health action plan in Ahmedabad, adopted after the deadly 2010 heatwave, was associated with [an estimated 1,190 fewer deaths a year](#), and combines early warning, public cooling, hydration, and targeted outreach. Primary care, vaccination and nutrition reduce the frequency and severity of the health shocks that follow disasters. In education, the priority is foundational learning, because the learning-poverty figures show that attendance has outpaced competence. Heat protection for workers, such as shade, water and adjusted schedules, protects the productivity on which the ILO's [US\\$361 billion estimate of preventable losses](#) is based.

Lever 7: Jobs, enterprise and regional integration

The jobs gap of Section 4 is the largest single obstacle to convergence at scale. Jobs come from firms, and firms need power, finance, skills, logistics and markets. Regional integration, which allows firms to reach larger markets and countries to share power and food reserves, is one of the few ways to overcome the small size of many African and island economies. The nature of the work matters too: construction and maintenance of resilient infrastructure, installation of solar and storage, and servicing of the digital economy are labour-intensive sectors that create jobs while building the capacity that reduces vulnerability. This is the most direct overlap between the convergence agenda and the resilience agenda.

Table 3. The seven accelerators: dual benefit, evidence, time to effect and binding constraint

Lever	Income channel	Vulnerability channel	Time to effect	Binding constraint
1. Power	Productivity, new firms, longer working hours	Cooling, clinics, pumps, warnings; less fuel-price exposure	2 to 8 years	Cost of capital; utility finances; ability to pay
2. Early warning	Better planting and trade decisions	Fewer deaths; avoided asset loss	1 to 5 years	Last-mile delivery; data and forecasting capacity
3. Social protection	Keeps assets and schooling; boosts local demand	Cushions shocks; reduces distress sales	2 to 5 years	Registries, payment rails and fiscal space
4. Resilient infrastructure	Reliable transport and utilities	Fewer outages; fewer losses	5 to 15 years	Upfront cost; code enforcement; planning
5. Farm productivity	Higher yields and farm income	Less hunger; less price pass-through	1 to 6 years	Inputs, credit and extension; water
6. Health and human capital	Healthier, more skilled workers	Lower mortality; faster recovery	2 to 10 years	Workforce; financing; quality of delivery
7. Jobs and integration	Direct incomes; larger markets	Savings buffers; stability	3 to 15 years	Power, skills, finance and trade barriers

Source: H Heuristics synthesis of the evidence cited in this section. Time to effect is the typical period before measurable results, not the period to full maturity.

8.3 The returns, and how to read them

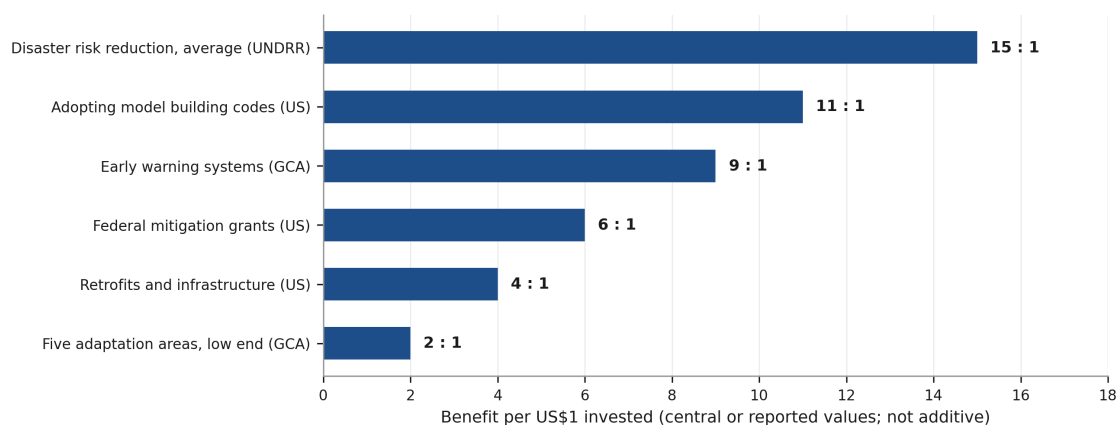


Figure 18. Reported benefit-cost ratios for resilience and adaptation measures.

Source: [UNDRR GAR 2025](#) (about US\$15 per US\$1 in avoided recovery costs); [NIBS 2019](#) (codes about 11 to 1; mitigation grants about 6 to 1; retrofits and infrastructure about 4 to 1; US evidence); [Global Commission on Adaptation](#) (early warning about 9 to 1; adaptation areas 2 to 1 to 10 to 1). Ratios use different methods and populations and are not additive.

These ratios are high, and they should be read with caution. They come from different methods, populations and time horizons, and several are based on United States data. A [PreventionWeb analysis](#) of early-warning statistics warns that figures like the oft-quoted tenfold return rest on thin evidence. The right interpretation is that the returns on well-targeted resilience spending are very probably well above one, and that the best measures return several times their cost, not that any particular number is precise. The decision-relevant point is that the cheapest measures are not the ones that attract the most financing, which flows disproportionately to reconstruction after the event.

8.4 Sequencing and complements

The levers depend on each other. Power makes warning, cooling and digital payments possible. Registries and payment rails make shock-responsive transfers possible. Building codes mean nothing without inspectors. Skilled workers are of little use without firms to employ them. A programme that funds one lever alone in a setting where the complements are missing will yield less than the headline return. This is the logic behind packaging: the model of Section 9 treats the growth lever and the capability lever as complements because the evidence from case studies suggests that they reinforce each other.

8.5 What the levers should not do

Two warnings apply. Acceleration should not raise exposure faster than it cuts sensitivity. That means pairing rapid urban growth with enforced codes and land-use rules, and building new power and transport networks to withstand the hazards of the next fifty years, not the last fifty. And acceleration should not lock in future vulnerability by tying poor economies to fuel-import dependence and volatile price exposure. Distributed solar, storage and efficiency reduce both emissions and import exposure, and in most settings they are also cheaper over the asset life. The aim is growth that is resilient from the first day, not growth to be made resilient later.

9. A Race Model: How Fast Must Convergence Move?

To test the argument quantitatively, H Heuristics built a small stylised model, the Convergence Race Model. It asks one question: for a representative convergence-critical economy, how does vulnerability per person, and the burden on a growing population, evolve under baseline growth, under an acceleration package of growth plus targeted capability building, and under delay? The model is an argument about orders of magnitude and about which levers matter. It is not a forecast, and its assumptions are stated in full in Appendix A.

9.1 Structure of the model

The model follows a representative economy from 2025 to 2075 and runs 20,000 Monte Carlo draws. Vulnerability per person in each year is the product of a hazard index and a sensitivity index, both normalised to 1.0 in 2025. Hazard grows at an annual rate drawn from a range that depends on the emissions path: 0.4 to 1.2 per cent for rapid decarbonisation, 0.8 to 2.0 per cent for current policies and 1.2 to 3.0 per cent for high emissions. Sensitivity falls with income, with an elasticity drawn from 0.4 to 1.2 that is consistent with the cross-country income gradient in disaster mortality, and falls further with targeted capability building. Income grows at a baseline rate of about 2.5 per cent per person, but each year's losses, which scale with vulnerability, drag growth down, so that vulnerability and convergence feed on each other.

The acceleration package has two levers. The *growth lever* raises per-person growth from about 2.5 to about 5 per cent a year over a ramp of 8 to 20 years, subject to a delivery factor of 50 to 100 per cent. The *capability lever* cuts sensitivity by a further 15 to 50 per cent at maturity, through early warning, social protection and resilient infrastructure, with its own ramp and delivery factor. A final output, the population-weighted burden, multiplies vulnerability per person by the size of the population, which grows at 1.2 to 2.4 per cent initially and decelerates, reaching about 1.4 times its 2025 size by 2050.

9.2 Income: partial catch-up even in the best case

Under baseline growth the representative economy's income rises from about US\$7,000 to about US\$11,200 by 2050 in purchasing-power terms. Under the acceleration package it reaches about US\$16,100, and if the package starts ten years late, about US\$13,100. In relative terms the representative economy starts at about 12 per cent of the high-income frontier, stays at about 13 per cent in 2050 under baseline growth and reaches about 19 per cent with acceleration: a real gain, but far from full convergence. This is the model's version of the arithmetic of Section 2. Even in the good case, income alone does not bring the economy to the levels at which sensitivity to shocks is low. The capability lever is therefore not an optional extra.

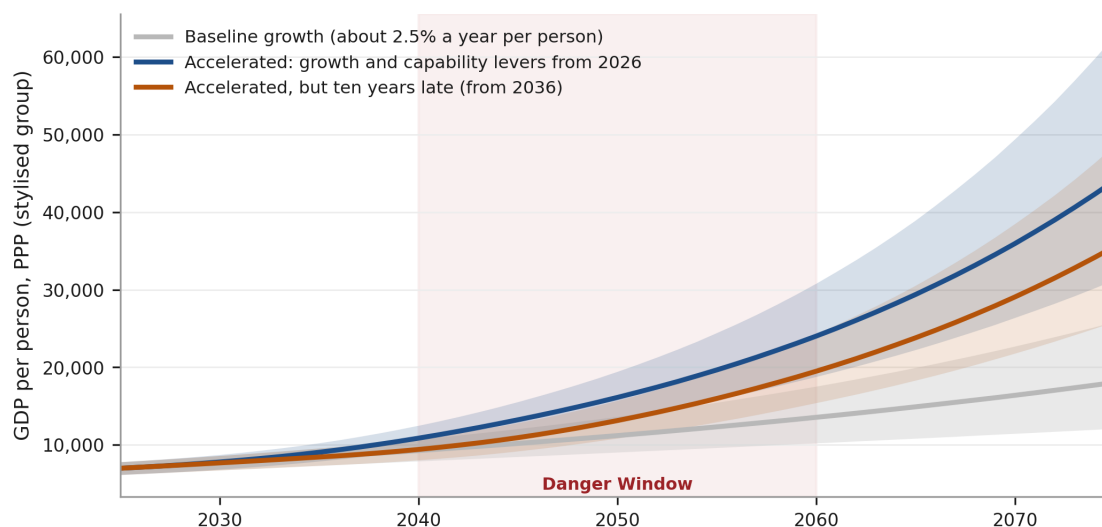


Figure 19. Modelled income per person under baseline growth, acceleration from 2026 and acceleration from 2036.

Source: H Heuristics Convergence Race Model (Appendix A). Current-policy hazard path; lines are medians and bands are 10th to 90th percentiles over 20,000 draws. Stylised representative economy; illustrative, not a forecast.

9.3 Vulnerability per person: flat without action, halved with it

Under baseline growth and current policies, vulnerability per person in 2050 is about 0.98 of its 2025 level, with a 10th to 90th percentile range of 0.80 to 1.17. In 56 per cent of the draws it is below its 2025 value and in 44 per cent above. In plain terms: on present trends it is close to a coin toss whether a typical convergence-critical economy is any less vulnerable in 2050 than today, because income gains are roughly offset by rising hazard. Under the acceleration package starting in 2026 the 2050 figure falls to about 0.55 (range 0.41 to 0.70), and in every draw it is below its 2025 level. If the same package starts in 2036, the 2050 figure is about 0.66 (range 0.52 to 0.81).

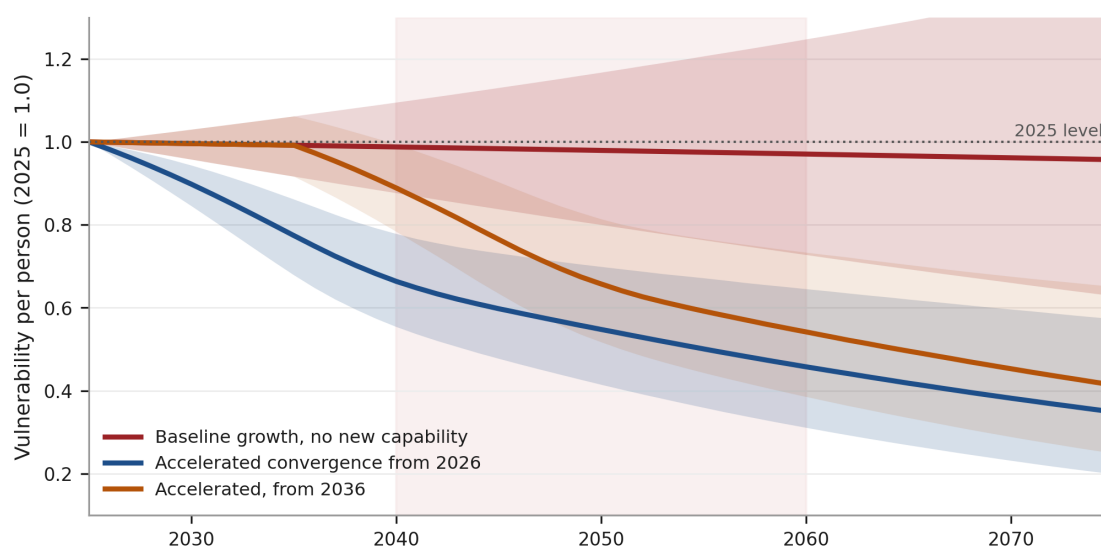


Figure 20. Vulnerability per person, 2025 to 2075: baseline, acceleration from 2026 and acceleration from 2036.

Source: H Heuristics Convergence Race Model (Appendix A). Current-policy hazard path; medians with 10th to 90th percentile bands. Index, 2025 = 1.0. Illustrative.

9.4 The two levers are complements

The model separates the contributions of the two levers. Under current policies, the growth lever alone brings the 2050 value to about 0.74 and cuts cumulative exposure over 2026 to 2075 by about 23 per cent. The capability lever alone brings it to about 0.72 and cuts exposure by about 22 per cent. Together they bring it to about 0.55 and cut exposure by about 40 per cent (range 31 to 49 per cent). The sum of the separate effects is 45 points against 40 for the combination, so the levers are not strictly additive: some of the capability lever's effect overlaps with what higher income would have delivered anyway. But neither lever alone approaches the combined effect, and the capability lever delivers almost the same benefit as growth on a shorter timescale and, on the evidence of Section 8, at a lower cost per unit of vulnerability removed.

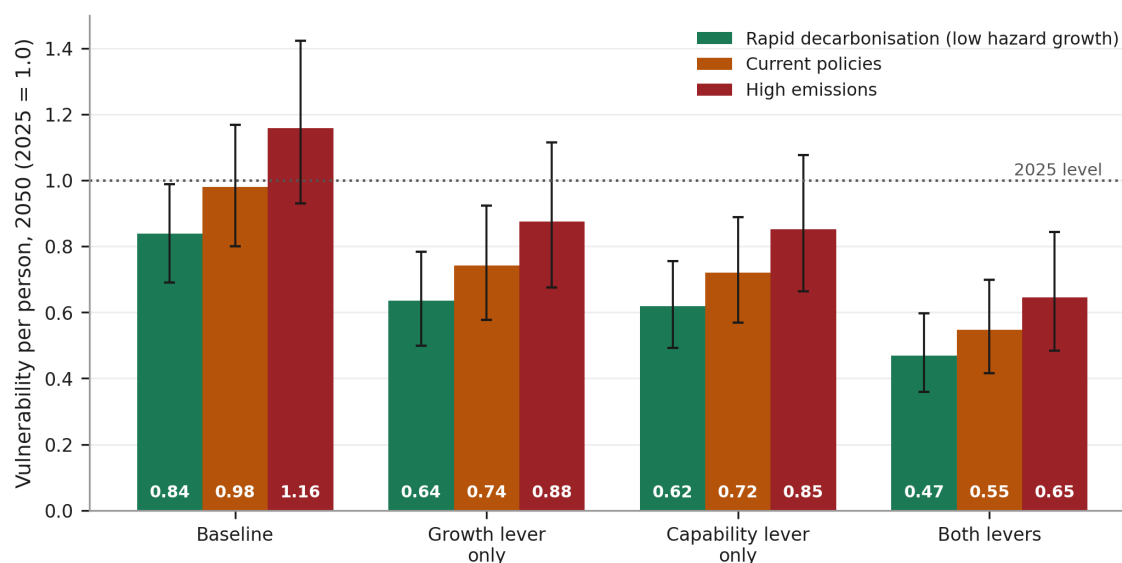


Figure 21. Vulnerability per person in 2050 by lever and by hazard path.

Source: H Heuristics Convergence Race Model (Appendix A). Bars are medians; whiskers are 10th to 90th percentiles. Low, current and high hazard growth correspond to rapid decarbonisation, current policies and high emissions. Index, 2025 = 1.0. Illustrative.

The same figure shows how much the hazard path matters. In the baseline, moving from current policies to rapid decarbonisation lowers the 2050 value from 0.98 to 0.84, while moving to high emissions raises it to 1.16. The acceleration package lowers it to 0.47 under low hazard growth, 0.55 under current policies and 0.65 under high emissions. Development therefore has a larger effect than mitigation by 2050 (a fall of about 0.43 against about 0.14 to 0.18), and by 2075 the spread across hazard paths in the baseline (0.69 to 1.36) is about as large as the effect of development. For the poorest economies, within the Danger Window, the faster lever is development. After the window, the slower lever, mitigation, catches up. The two are complements across time as well as across mechanisms.

Table 4. Race model headline results, current-policy hazard path (medians, with 10th to 90th percentiles in brackets)

Scenario	Vulnerability per person, 2050	Population-weighted burden, 2050	Cumulative exposure cut, 2026 to 2075	Chance burden below 2025 level in 2050
Baseline growth	0.98 (0.80 to 1.17)	1.37 (1.11 to 1.65)	0	3%

Scenario	Vulnerability per person, 2050	Population-weighted burden, 2050	Cumulative exposure cut, 2026 to 2075	Chance burden below 2025 level in 2050
Growth lever only	0.74 (0.58 to 0.92)	1.04 (0.80 to 1.30)	23% (14 to 34)	42%
Capability lever only	0.72 (0.57 to 0.89)	1.01 (0.79 to 1.25)	22% (15 to 31)	48%
Both levers, from 2026	0.55 (0.41 to 0.70)	0.77 (0.58 to 0.99)	40% (31 to 49)	91%
Both levers, from 2036	0.66 (0.52 to 0.81)	0.92 (0.72 to 1.15)	28% (21 to 35)	68%

Source: H Heuristics Convergence Race Model (Appendix A); 20,000 draws. Index values, 2025 = 1.0. Illustrative; see Appendix A for parameters and caveats.

9.5 The burden on a growing population

Because populations are growing, the number that matters for total harm is the population-weighted burden. Here the baseline is worse than flat. With population about 40 per cent larger by 2050 and vulnerability per person roughly unchanged, the burden is about 1.37 times its 2025 level (range 1.11 to 1.65), and in only 3 per cent of draws is it lower than today. Under high emissions it is about 1.62. Neither lever alone is enough to bring the burden reliably below its 2025 level: growth alone gives about 1.04 and capability alone about 1.01, which are coin tosses in the model (42 and 48 per cent chances of falling below the 2025 level). Both levers together bring it to about 0.77, below the 2025 level in 91 per cent of draws. The practical reading is that merely holding the total burden constant requires the full package.

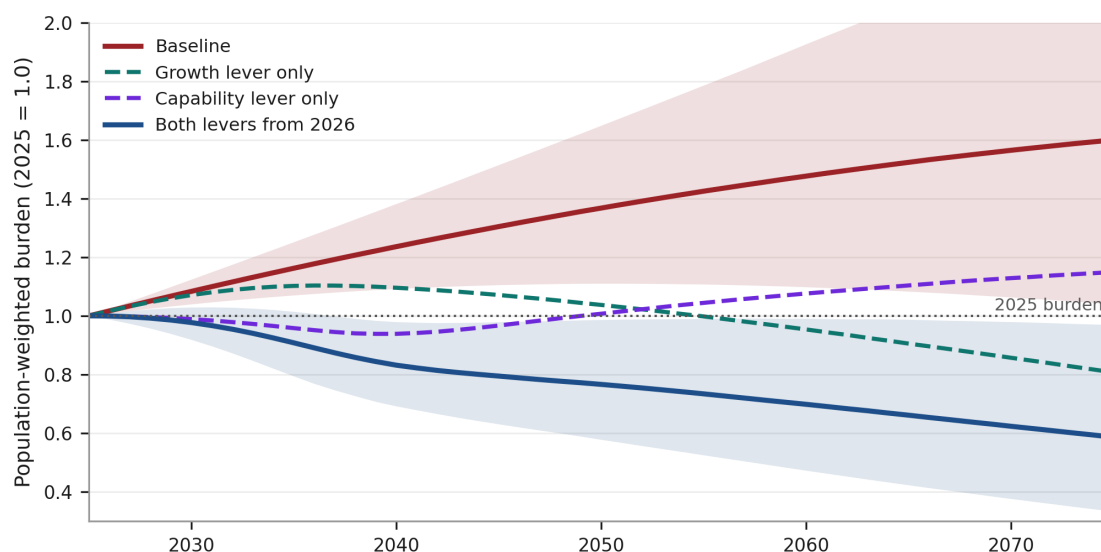


Figure 22. Population-weighted burden of vulnerability under each lever, current-policy hazard path.

Source: H Heuristics Convergence Race Model (Appendix A). Burden is vulnerability per person times a population index that grows to about 1.4 by 2050 and 1.7 by 2075 (median). Lines are medians; bands show the 10th to 90th percentile for the baseline and the combined package. Index, 2025 = 1.0. Illustrative.

9.6 What drives the results

A rank-correlation analysis of the draws shows which assumptions matter most to the size of the benefit. The size of the capability lever is the strongest positive driver (correlation +0.49), followed by the accelerated growth rate (+0.43). The baseline growth rate is the strongest negative driver (-0.48), because a higher baseline leaves less room for the package to add. The elasticity of sensitivity to income, the delivery

of each lever and the hazard growth rate matter less. The ranking has a practical implication: the benefit depends most on what can be done in policy, the strength of targeted capability building and the pace of acceleration, and less on parameters outside policy control.

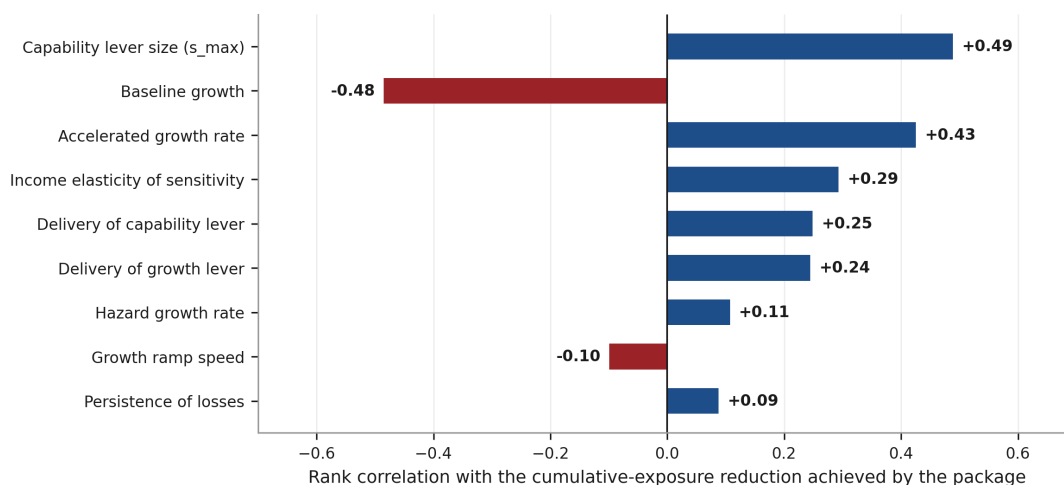


Figure 23. Drivers of the benefit of the acceleration package: rank correlation with the reduction in cumulative exposure.

Source: H Heuristics Convergence Race Model (Appendix A). Spearman rank correlations across 20,000 draws, current-policy hazard path, combined package versus baseline. Illustrative.

9.7 The price of delay

The most policy-relevant result concerns timing. Holding everything else constant, each year of delay in starting the package raises cumulative exposure over 2026 to 2075 by about 2 per cent relative to starting in 2026. Starting in 2030 adds about 8 per cent, starting in 2036 adds about 20 per cent (range 13 to 28), starting in 2040 about 27 per cent and starting in 2046 about 37 per cent. A ten-year delay forfeits about 12 of the 40 percentage points of exposure reduction, almost a third of the benefit. In the first 25 years the effect is larger: the package starting in 2026 cuts cumulative exposure by about 26 per cent over 2026 to 2050, while the same package starting in 2036 cuts it by only about 10 per cent. The benefits of acting early are front-loaded because the early years are the ones when the window is still open.

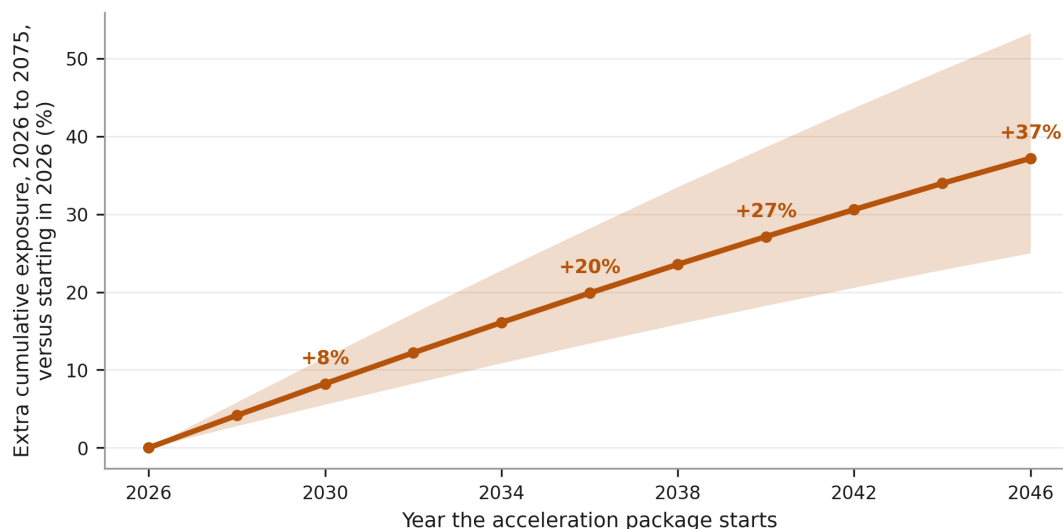


Figure 24. *The price of delay: extra cumulative exposure, 2026 to 2075, as a function of the year the package starts.*

Source: H Heuristics Convergence Race Model (Appendix A). Median and 10th to 90th percentile band across 20,000 draws, current-policy hazard path, relative to starting in 2026. Illustrative.

9.8 What the model leaves out

The model is a deliberate simplification. It treats a representative economy and not a distribution of households, so it cannot show how benefits are shared; the poorest people in any economy may see slower gains than the average. It treats hazard growth as smooth, so it does not capture tipping points, compound extremes or conflict, any of which could produce discontinuous jumps in vulnerability. It treats the levers as additive investments with delivery factors and does not model the politics of delivery. And it assumes that vulnerability responds smoothly to income, whereas in practice thresholds matter: a country either has a functioning warning network or it does not. These omissions make the numbers illustrative. The conclusions that should survive them are directional: that baseline convergence leaves vulnerability roughly flat while burdens grow, that the two levers are complements, that the benefit depends most on policy-controlled parameters and that delay is costly.

10. Financing the Acceleration

The levers in Section 8 are cheaper than the damage they prevent, but cheap is not free, and the governments that most need them are the ones with the least room to borrow. This section sizes the need, sets out the main channels for meeting it and argues that how finance is delivered matters as much as how much of it there is.

10.1 Sizing the need

No single number captures the cost of convergence before crisis, and the report does not offer one. The available estimates cover different scopes, and they are best read as a set of landmarks. UNEP puts developing countries' adaptation needs at about [US\\$310 billion a year by 2035, or US\\$365 billion on the basis of their own plans](#), against US\$26 billion of international public flows in 2023. The IEA estimates that clean energy investment in emerging and developing economies outside China must rise [more than sixfold, from about US\\$270 billion to US\\$1.6 trillion a year by the early 2030s](#). The [Sevilla process](#) framed the overall financing gap for the development goals at about US\$4 trillion a year. Mission 300 had committed nearly US\$15 billion by October 2026 and mobilised about US\$4.5 billion in co-financing.

The costs of the capability measures in particular are small beside these totals. The Global Commission on Adaptation estimated that [investing about US\\$800 million in early warning systems in developing countries could prevent US\\$3 to 16 billion a year in losses](#), and the UN's Early Warnings for All plan for universal coverage was costed at about US\$3 billion over five years. Even allowing for the wide uncertainty in such estimates, these are orders of magnitude below the recurring losses of the disasters they address. A global comparison makes the same point. UNDRR's estimate of the full annual cost of disasters is about US\$2.3 trillion. If adaptation of the scale UNEP describes, at US\$310 to 365 billion a year, cut that cost by only 15 per cent, the avoided loss would be about US\$345 billion a year, roughly equal to the outlay before any development, health or income benefit is counted.

10.2 The channels

Six channels deserve attention, and each addresses a different part of the problem. *Concessional and multilateral finance* provides long-dated capital at below-market cost, and the main opportunity is the stretching of multilateral balance sheets. *Debt relief and restructuring* frees fiscal space: Zambia's [2024 restructuring agreement](#) showed that restructuring can be done, and also how slowly. *Lowering the cost of capital* means guarantees, currency-risk instruments and first-loss capital that make private investment in power and infrastructure bankable. *Domestic resource mobilisation* means broadening tax bases, improving collection and reforming subsidies, notably fuel subsidies that can be replaced with targeted cash. *Risk finance* means contingent facilities, parametric insurance and pre-arranged credit lines that pay out quickly after a shock. *Private and household capital*, including remittances and small-scale investment in solar, plays a larger role than headline figures suggest and responds well to enabling regulation.

Table 5. Financing channels for acceleration: what each fixes, and its limit

Channel	What it fixes	Example or lever	Limit	Who must act
Concessional and MDB finance	Long-dated capital at low cost	Balance-sheet optimisation; Mission 300 compacts	Shareholder politics; capacity to absorb	Shareholders; MDB boards

Channel	What it fixes	Example or lever	Limit	Who must act
Debt relief and swaps	Fiscal space for preparation	Restructuring; debt pause clauses; debt-for-resilience swaps	Slow; creditor coordination	Creditors; IMF; debtor governments
Lower cost of capital	Bankability of power and infrastructure	Guarantees; FX instruments; first-loss capital	Needs strong project pipelines	MDBs; DFIs; regulators
Domestic resources	Recurrent funding of services	Tax reform; subsidy reform with cash transfers	Politically hard; limited in fragile states	Finance ministries
Risk finance	Speed of response after a shock	Contingent credit; parametric insurance	Basis risk; premium cost	Regional pools; donors
Private and household	Scale and local ownership	Distributed solar; remittance-funded investment	Needs regulation and credit	Regulators; fintech; utilities

Source: H Heuristics synthesis of the channels discussed in Sections 6 and 10, drawing on [IEA](#), [UNCTAD](#) and the [Sevilla outcome](#).

10.3 The shape of the finance stack by archetype

The channels combine differently across the archetypes of Section 7. In fragile settings (archetype 1) the stack is mainly grants and highly concessional finance, delivered through channels that can operate with weak state capacity, with an emphasis on warning, cash and basic services, and with a high tolerance for failure in individual projects. In large low-income and lower-middle-income economies (archetypes 2 and 3) it is mainly concessional lending, guarantees and private capital for power and infrastructure, with risk finance for the tail. In small island states (archetype 4) it is pre-arranged contingent finance, debt-for-resilience swaps and regional pooling, because the costs of a single storm are often larger than annual revenue. In middle-income economies (archetype 7) it is mainly private and domestic capital, with public money focused on enforcement capacity and technical assistance.

10.4 Delivery matters as much as volume

Three features of delivery determine whether money translates into capability. Speed: finance that arrives late has far less effect than finance that arrives in time. Predictability: governments cannot plan a shelter network or a payment system on year-to-year allocations. Form: grants and concessional loans suit public goods, and guarantees and equity suit revenue-earning assets. The shift of aid toward loans, and the high share of adaptation finance that arrives as debt, work against all three. A realistic financing strategy for convergence before crisis therefore prioritises predictable, front-loaded and concessional flows to the places where fiscal space is least, and uses the multilateral balance sheet to leverage private capital where revenue streams exist.

10.5 What the aid retreat changes

The retreat of bilateral aid, at 23 per cent in a single year, changes the plan in two ways. It makes the most expensive levers harder to fund in the poorest countries, which raises the relative importance of the cheapest ones: warning, registries, cash and policy reform. And it raises the stakes for the efficiency of what remains. The model suggests that concentration on the capability lever in the most vulnerable economies, together with measures to lower the cost of capital, offers the best return per dollar of scarce public money.

11. Governance, Sequencing and a Roadmap

The previous sections argue for a set of levers and a pace. This section turns them into a sequence, sets out who must do what in the first five years, proposes indicators to track progress and identifies the political conditions that make delivery more likely.

11.1 Principles

Four principles guide the roadmap. *Country-led*: the plans and priorities must belong to the governments and communities that will carry them out, because externally designed programmes are the least likely to be maintained. *Capability first*: where income cannot yet buy a buffer, targeted investment in the buffer should come first. *Risk-informed*: every new investment, from a road to a housing estate, should be assessed against the hazards of its design life. *Measured*: progress should be tracked against indicators that capture vulnerability and not just spending or output, with district-level data where possible.

11.2 A three-phase roadmap

The roadmap divides 2026 to 2050 into three phases that match the logic of the window. The first, 2026 to 2030, builds foundations: connecting people to power, establishing warning and cash systems, restructuring debt, lowering the cost of capital and improving the data on which targeting depends. The second, 2031 to 2040, scales and industrialises: grid-connected industry, resilient cities and housing, skills for a very large cohort of new workers and deeper regional integration of power and trade. The third, 2041 to 2050, holds the gains through the window: maintaining and upgrading infrastructure, operating fiscal buffers that trigger automatically and avoiding the loss of a decade to any single shock.

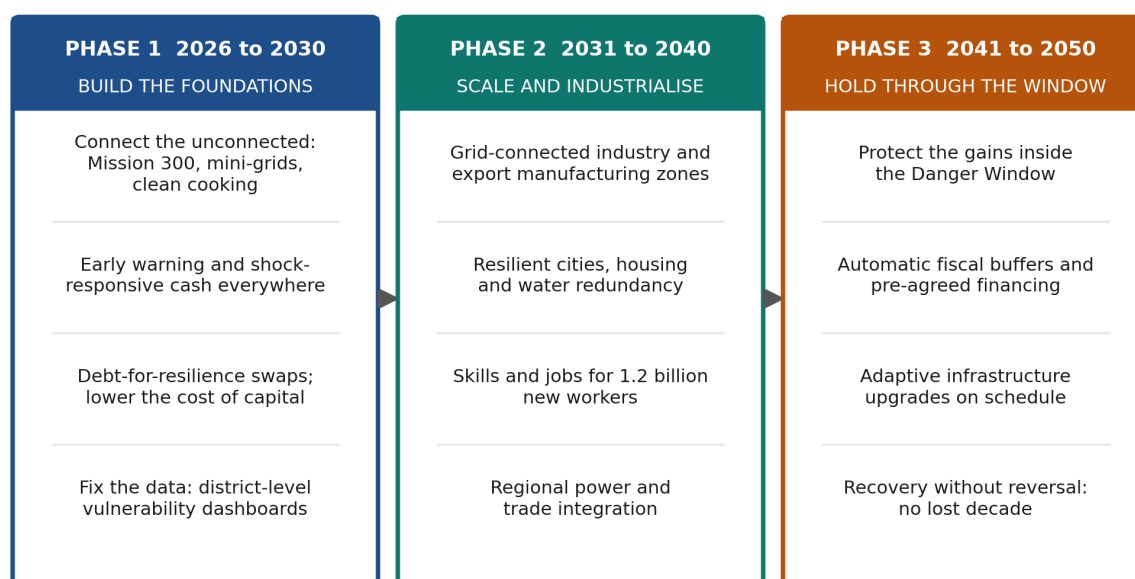


Figure 25. A three-phase roadmap from foundations to scale to holding the gains through the window.

Source: H Heuristics. Phases correspond to the logic of the race model and the Danger Window; the content of each phase is indicative and varies by archetype.

11.3 Who must do what

Table 6. Priority actions by actor, 2026 to 2030

Actor	Priority actions in the first five years
Governments of vulnerable economies	Publish a vulnerability map and a costed convergence-and-resilience plan; build the registry, payment rail and warning chain; enforce codes in new construction; reform subsidies into targeted cash; adopt risk-informed land-use rules; join regional power and trade pools
Multilateral development banks	Stretch balance sheets; scale guarantees and local-currency lending; adopt climate-resilient debt clauses as standard; make concessional windows available for fragile states; report vulnerability outcomes, not just disbursements
Bilateral donors and philanthropy	Maintain and concentrate grants on the cheapest, highest-return levers in fragile settings; fund data and delivery systems; avoid fragmenting pledges across thousands of small projects
IMF and creditors	Speed up restructuring; embed pause clauses; recognise resilience spending in debt-sustainability analysis; expand contingent financing for shocks
Private sector and utilities	Invest in distributed solar, storage, cold chains and local manufacture; offer insurance and payments products to the uncovered; pay fair prices for local content
Civil society and researchers	Track delivery in districts; audit warning and transfer systems; build the evidence base on what works; hold governments and funders to published targets

Source: *H Heuristics synthesis of Sections 5 to 10.*

11.4 Indicators and benchmarks

The model implies a small set of indicators that track the drivers of vulnerability and not only the inputs. The report proposes six: the share of the population covered by early warning and by shock-responsive social protection; the number of people with reliable electricity and clean cooking; the ratio of debt service to revenue; the cost of capital for infrastructure relative to advanced economies; the number of new formal jobs relative to new entrants to the labour force; and a district-level vulnerability index drawing on the measures in Table 1. Benchmarks should be set by countries and not imposed, but a few reference points are useful. Universal early warning coverage by 2027 is already the UN target. Social protection coverage in low-income countries, stuck at under 10 per cent, should at least triple by the mid-2030s, from under 10 per cent to above 30 per cent. Electrification must roughly double its recent pace in Africa to meet the Mission 300 target. These are H Heuristics proposals offered for discussion, not official targets.

11.5 The political economy of delivery

Delivery depends on political conditions as much as on money. Governments need continuity over a decade, which is rare, and the most durable programmes are those that create constituencies: farmers who receive forecasts they trust, households that rely on transfers, firms that depend on reliable power. Vulnerable economies have also learned to coordinate. The V20 group of climate-vulnerable economies, together with initiatives such as Barbados's Bridgetown agenda, has turned individual requests into collective positions on debt, the cost of capital and the reform of the multilateral banks. A strategy of convergence before crisis leans on this coalition and on reformist development banks, and on the philanthropic and private actors who can move quickly where public money is slow.

12. Objections, Risks and Limits

A report that argues for acceleration should test its own argument. This section takes the strongest objections in turn, says where they have force and sets out what would change the conclusions.

12.1 “Faster growth means more emissions”

The worry is legitimate, and it is the reason the report stresses distributed solar, storage, efficiency and resilient infrastructure rather than growth of any kind. The low-income economies at the centre of the argument account for a very small share of global emissions, and the technologies that raise their incomes most quickly are in many cases the cleanest and cheapest. The risk is real where growth is built on new fossil capacity that will become a stranded asset or a price exposure, and the report treats avoiding that as part of the definition of good acceleration. The model's results also show that the hazard path matters: under high emissions, even the full package leaves vulnerability per person at about 0.65 of its 2025 level in 2050, compared with 0.47 under rapid decarbonisation. Mitigation remains essential, and nothing in this report argues for relaxing it.

12.2 “The aid cuts make this unrealistic”

The retreat of aid does make the programme harder, and the report says so. The answer is partial. The cheapest levers, warning, registries, cash and policy reform, do not depend on large flows. The most expensive, power and infrastructure, can draw on private and multilateral capital if the cost of capital falls. And the model shows that the capability lever delivers almost as much as the growth lever by 2050, on a shorter timescale and, on the evidence of Section 8, at a lower cost per unit of vulnerability removed. But the answer is not complete: in the poorest and most fragile economies there is no substitute for grants, and a retreat of grants will leave some places further behind. Whether the aid retreat is a temporary shock or a permanent shift is the largest single uncertainty over the financing picture.

12.3 “Development raises exposure”

It does, and the report discusses the point in Section 3.5. Fast growth puts more people and assets in harm's way. The response is not to slow growth but to build codes, land-use rules and infrastructure standards in step with it. The evidence from the cases that worked, in Bangladesh, Odisha and parts of Southeast Asia, is that exposure grew while deaths fell, because sensitivity fell faster. The model does not capture exposure growth separately: it is subsumed in hazard growth. A more detailed model would separate the two and would show that unmanaged exposure growth can erode much of the benefit. This is a limitation, and it is the reason the report treats enforcement capacity as a core part of the capability lever.

12.4 “The model is too stylised to guide policy”

It is stylised, and Appendix A lists its simplifications. The defence is that its purpose is to test the logic of the argument, not to forecast. Each of the key results, that baseline convergence leaves vulnerability per person roughly flat while burdens grow, that the two levers are complements, that capability building is as valuable as growth within the window and that delay is costly, follows from a small number of transparent relationships, and each survives the range of parameters tested. The rank-correlation analysis in Figure 23 shows which assumptions matter. The conclusions that depend on specific numbers should be treated as illustrations of scale, not predictions.

12.5 “Poor countries will stay poor”

The pessimistic reading of the record holds that convergence is a mirage and that most poor countries remain stuck. The evidence in Section 2 is mixed. Kremer, Willis and You find convergence since the 1990s, and the correlates of growth have converged too. But the 2020s have gone badly, one third of low-income economies will be poorer in 2026 than in 2019, and fragile states are not converging at all. The report's position is that convergence is possible but not automatic, that it is slowest where vulnerability is highest, and that this is why capability building should not wait for it.

12.6 “Adaptation distracts from mitigation”

The concern is that investment in resilience reduces the political pressure to cut emissions. The model suggests the opposite relationship in the poorest economies: the faster they develop and build capability, the more they can bear and the less they are forced into reactive, short-term decisions, and the hazard path still determines the long-run outcome after 2060. The two agendas also share beneficiaries. Resilience in the places most exposed to warming raises the political cost of failing to mitigate. The report therefore treats adaptation and mitigation as complements, and the finding that development has a larger effect than mitigation by 2050 and a comparable one by 2075 is an argument for doing both in parallel.

12.7 Risks the report does not resolve

Some risks lie outside the reach of the levers. Conflict can destroy years of progress in months. Tipping points in the climate system could raise hazards faster than any smooth path assumes. Governments may fail to deliver, whether through capture, corruption or simple incapacity, and money spent on warning systems that are not maintained buys little. Debt crises could erase fiscal space in a handful of large economies. And the evidence base is thin in places: several of the most-quoted figures, including the returns on early warning, rest on modelled estimates, and some of the data in the poorest countries are poor. The report's response is to rely on the direction of the evidence, to state uncertainty, and to recommend investment in measurement as part of the plan.

12.8 What would change the conclusions

Four developments would weaken the case. If capability measures such as warning and protection were shown to deliver much smaller reductions in sensitivity than the case studies suggest, the capability lever would shrink and the growth lever would dominate. If population growth in the most exposed regions fell much faster than the UN medium variant projects, the burden problem would ease. If the cost of capital for vulnerable economies fell sharply without policy change, the financing section would matter less. And if hazard growth were much slower than assumed, the urgency would fall. None of these looks likely on present evidence, but each is a testable condition, and the indicators in Section 11.4 are designed to detect them.

13. Conclusion: The Case for Moving First

Vulnerability is not destiny. It is the product of conditions that can be changed, and the evidence from Bangladesh to Odisha shows that it can fall faster than income when the right buffers are built early. The case for convergence before crisis is that the window for building them is open now, that it is narrowing and that the cost of waiting rises every year.

The report's main findings can be stated briefly.

- **Convergence is real but slow, and the 2020s have stalled it.** Poor economies have been catching up since the 1990s, but the World Bank expects one third of low-income and half of fragile economies to be poorer at the end of 2026 than in 2019, and the arithmetic of reaching the middle-income stalling point from the low-income average takes from 36 to over 100 years at plausible growth rates.
- **Income cannot do the job alone in time.** Arriving at about US\$8,000 a head by 2050 from US\$700 would require growth of about 10.7 per cent a year. The poorest economies will not complete income convergence before the Danger Window, so vulnerability reduction must lead income.
- **Vulnerability can fall faster than income.** Bangladesh cut cyclone deaths from about 300,000 in 1970 to a few dozen in 2020, and Odisha did the same on a smaller scale. Early warning, shelter, social protection, reliable power and public health are the buffers that do this work.
- **The clock is running.** Warming is heading toward 2.8 °C on current policies, Africa's population may reach 3.8 billion by 2100, 1.2 billion young people will reach working age in a decade, and the full cost of disasters is already about US\$2.3 trillion a year.
- **The money is moving the wrong way.** Aid fell 23 per cent in 2025, 3.4 billion people live in countries paying more interest than they spend on health or education, adaptation finance is about a twelfth of need, and the 2026 energy and fertiliser shock has hit import-dependent economies hardest.
- **The levers are complements.** In the race model, a combined package of faster growth and targeted capability building cuts cumulative exposure by about 40 per cent under current policies, with each lever alone delivering about 22 to 23 per cent, and keeps the population-weighted burden below its 2025 level in 91 per cent of draws, against 3 per cent for the baseline.
- **Delay is costly.** Each year of delay adds about 2 per cent to cumulative exposure, and a ten-year delay forfeits roughly 30 per cent of the benefit. The cheapest window is the one that is open now.

Three implications follow for decisions. For governments of vulnerable economies, the priority is to build the registries, payment rails, warning chains and reliable power that make every later investment work, and to enforce codes as growth accelerates. For development banks and donors, the priority is to concentrate scarce concessional money on the cheapest, highest-return levers in the places where fiscal space is thinnest, to lower the cost of capital where revenue streams exist and to measure results in vulnerability, not disbursements. For the international system, the priority is to restructure debt faster, to make resilience spending count in debt-sustainability analysis and to treat the finance of convergence as part of the finance of climate stability.

The title of this report states a preference about order. If convergence comes before crisis, the crisis is survivable, and the shocks of the 2040s and 2050s become setbacks and not collapses. If crisis comes before convergence, the same shocks arrive at economies that are poorer, more indebted and less protected, and the cost is counted in lives as well as income. The window is still open. The choice about what to do with it belongs to the decade now beginning.

Appendix A. The Convergence Race Model: Specification and Parameters

This appendix sets out the model used in Section 9 so that the results can be reproduced and challenged. The model is stylised and illustrative, and its purpose is to test the logic of the argument, not to forecast the future of any country.

A.1 Structure

For each Monte Carlo draw the model follows a representative economy from 2025 to 2075. The vulnerability index in year t is $V(t) = H(t) \times S(t)$, where $H(t) = (1 + g_H)^{(t - 2025)}$ is the hazard index and $S(t) = (y_0 / y(t))^\epsilon \times (1 - s(t))$ is the sensitivity index. Income evolves as $y(t+1) = y(t) \times (1 + g(t) - \rho \times L_0 \times V(t))$, so that annual losses, equal to $L_0 \times V(t)$ of output, depress growth in proportion ρ . Growth $g(t)$ equals the baseline rate g_{base} , or, under the growth lever, rises toward the accelerated rate g_{acc} over a ramp of $rampG$ years, scaled by a delivery factor dG . The capability lever $s(t)$ rises linearly to $s_{max} \times dS$ over $rampS$ years from the start year. The population index grows at $n_0 \times (1 - nd)^{(t - 2026)}$ per year. The population-weighted burden is $B(t) = V(t) \times Pop(t)$.

Table A1. Parameters of the Convergence Race Model (triangular distributions: low, mode, high)

Parameter	Meaning	Low	Mode	High
ϵ	Elasticity of sensitivity to income	0.40	0.80	1.20
g_{base}	Baseline growth in income per person, per year	1.2%	2.5%	3.5%
g_{acc}	Accelerated growth when fully delivered	3.5%	5.0%	6.5%
g_H (low)	Hazard growth, rapid decarbonisation	0.4%	0.8%	1.2%
g_H (current)	Hazard growth, current policies	0.8%	1.4%	2.0%
g_H (high)	Hazard growth, high emissions	1.2%	2.0%	3.0%
L_0	Annual loss share of output at $V = 1$	0.5%	1.0%	2.0%
ρ	Share of annual loss that persists as lower growth	0.20	0.40	0.70
s_{max}	Maximum extra cut in sensitivity from capability building	15%	30%	50%
$rampG, rampS$	Years to reach full growth lever; full capability lever	8; 8	12; 14	20; 22
dG, dS	Delivery factors for growth and capability levers	0.50; 0.55	0.75; 0.80	1.00; 1.00
y_0	Income per person in 2025, PPP US\$ (representative group)	5,500	7,000	8,500
n_0, nd	Initial population growth; annual decay of that rate	1.2%; 1.5%	1.8%; 2.5%	2.4%; 3.5%

Source: H Heuristics. 20,000 draws; random seed 20261019. Ranges are stylised and anchored to the literature cited in Sections 2 to 6, not estimated from a single dataset.

A.2 Anchors and what each parameter represents

The income elasticity ϵ is anchored to the cross-country evidence in [Kahn \(2005\)](#) and the [CRED review](#), which find that disaster mortality falls substantially as income rises; the 0.4 to 1.2 range spans modest and strong gradients. Baseline growth reflects recent per-person growth in low- and lower-middle-income economies, with the lower end reflecting the stall of the 2020s. The accelerated rate, 3.5 to 6.5 per cent, is

within the range of sustained performance recorded for successful economies in the [Growth Report](#) but below the 7 per cent sustained by its thirteen outliers. The loss share and its persistence are stylised, informed by the evidence on disaster losses in [GAR 2025](#) and on persistent growth effects in [Dell, Jones and Olken](#). Hazard growth is a compact way of representing the combined effect of warming, extremes and growth in exposure; the three paths correspond loosely to warming outcomes of about 2 °C, 2.8 °C and above 3 °C, in line with the [Emissions Gap Report 2025](#). Population parameters approximate the UN medium variant for the Sub-Saharan Africa-weighted group, as summarised by [Pew](#).

A.3 Limitations

The model represents a single economy, so it says nothing about distribution within or between countries. It treats hazard growth as smooth, so does not capture tipping points. It represents policy through two lumped levers with delivery factors, so it does not capture how policy is actually made. It treats the capability lever as reducing sensitivity by a share, when in practice the effect depends on whether specific systems are in place and operating. It abstracts from conflict, which is the largest risk to convergence in the most fragile economies. The results should be read as the output of an argument, and the parameter ranges can be changed to test other views. The specification above, with the parameter ranges in Table A1, is sufficient to reproduce the results.

Appendix B. Evidence Grading and Data Notes

Not all figures in this report have equal standing. This appendix grades the main quantitative claims by type of evidence and confidence so that readers can weigh them accordingly.

Table B1. Principal claims, evidence type and confidence

Claim	Source	Type	Confidence
Low-income GDP per person under US\$700, about 1 per cent of high-income	World Bank blog, Jan 2026	Official statistic	High
One quarter, one third and one half of economies poorer at end-2026 than in 2019	World Bank GEP, Jun 2026	Projection	Medium
808 million extreme poor in 2025; 73 per cent in Sub-Saharan Africa	World Bank, Jun 2025	Projection from survey data	Medium to high
Aid fell about 23 per cent in real terms in 2025	OECD, Apr 2026	Preliminary official data	High
3.4 billion people in countries paying more interest than for health or education	UNCTAD	Analytical estimate	Medium to high
Adaptation needs of US\$310 to 365 billion a year by 2035; flows of US\$26 billion	UNEP AGR 2025	Modelled need; reported flows	Medium
Full annual cost of disasters about US\$2.3 trillion	UNDRR GAR 2025	Modelled estimate	Medium to low
Heat deaths 546,000 a year; US\$1.09 trillion lost labour income	Lancet Countdown 2025	Modelled estimate	Medium
Lower-income countries: 44 per cent of disasters, 68 per cent of deaths	CRED	Recorded events	Medium to high
Bangladesh cyclone deaths 300,000 (1970) to about two dozen (2020)	TBS; Red Cross	Recorded events	High for order of magnitude
Early warning returns of about 9 to 1; 30 per cent damage cut from 24 hours' notice	GCA; PreventionWeb	Modelled; thin provenance	Low to medium
Race model: 40 per cent cut in cumulative exposure; 91 per cent chance burden falls	H Heuristics, Appendix A	Illustrative model	Illustrative only

Source: H Heuristics. Confidence is a judgement about how well the figure is established, not about its policy relevance. Several figures were released in 2026 and may be revised.

Three data notes apply. Figures from news and secondary summaries of official releases, including those for the October 2026 IMF outlook, the Mission 300 tally and the World Bank's April 2026 commodity projections, should be checked against the primary documents as these are published in full. Where the World Bank and the IMF differ on growth, the difference reflects the weighting of countries (market exchange rates against purchasing-power parity) and not a disagreement about direction. And the report uses US dollar figures from sources that use different base years; no attempt has been made to restate them in common prices.

Appendix C. Selected Sources

The principal sources used in the report are listed below, grouped by theme. Each is linked, and every claim in the text is also linked at the point it appears.

Convergence, growth and development

- [Kremer, Willis and You, *Converging to Convergence*, NBER Working Paper 29484](#)
- [World Bank, World Development Report 2024: The Middle-Income Trap](#)
- [Commission on Growth and Development, *The Growth Report*, as summarised by the IMF](#)
- [Rodrik, *Premature Deindustrialization*, NBER Working Paper 20935](#)
- [World Bank, Global Economic Prospects, June 2026](#)
- [World Bank Group, jobs crisis and High-Level Advisory Council, August 2024](#)

Poverty, energy and protection

- [World Bank, June 2025 update to global poverty lines](#)
- [World Bank Development for Peace, *When Poverty Meets Fragility*](#)
- [Tracking SDG7: The Energy Progress Report 2026](#)
- [Mission 300 progress, October 2026](#)
- [ILO, World Social Protection Report 2024 to 2026](#)
- [FAO, State of Food Security and Nutrition 2026](#)

Hazards, disasters and vulnerability

- [UNEP, Emissions Gap Report 2025](#)
- [WMO, 2025 was one of the warmest years on record](#)
- [The 2025 report of the Lancet Countdown on health and climate change](#)
- [UNDRR, Global Assessment Report 2025: Resilience Pays](#)
- [CRED, The Human Cost of Natural Disasters: A Global Perspective](#)
- [Kahn, *The Death Toll from Natural Disasters*, Review of Economics and Statistics, 2005](#)
- [World Bank, *Unbreakable: Building the Resilience of the Poor*](#)
- [INFORM Risk Index](#) and [ND-GAIN Country Index](#)
- [IPCC AR6 Working Group II: Impacts, Adaptation and Vulnerability](#)

Finance

- [OECD, preliminary ODA data for 2025](#)
- [UNCTAD, A World of Debt](#)
- [UNEP, Adaptation Gap Report 2025](#)
- [IEA, Reducing the Cost of Capital](#)
- [IISD, Financing for Development outcome document](#)

- [COP30 Belém Package](#)