H HEURISTICS

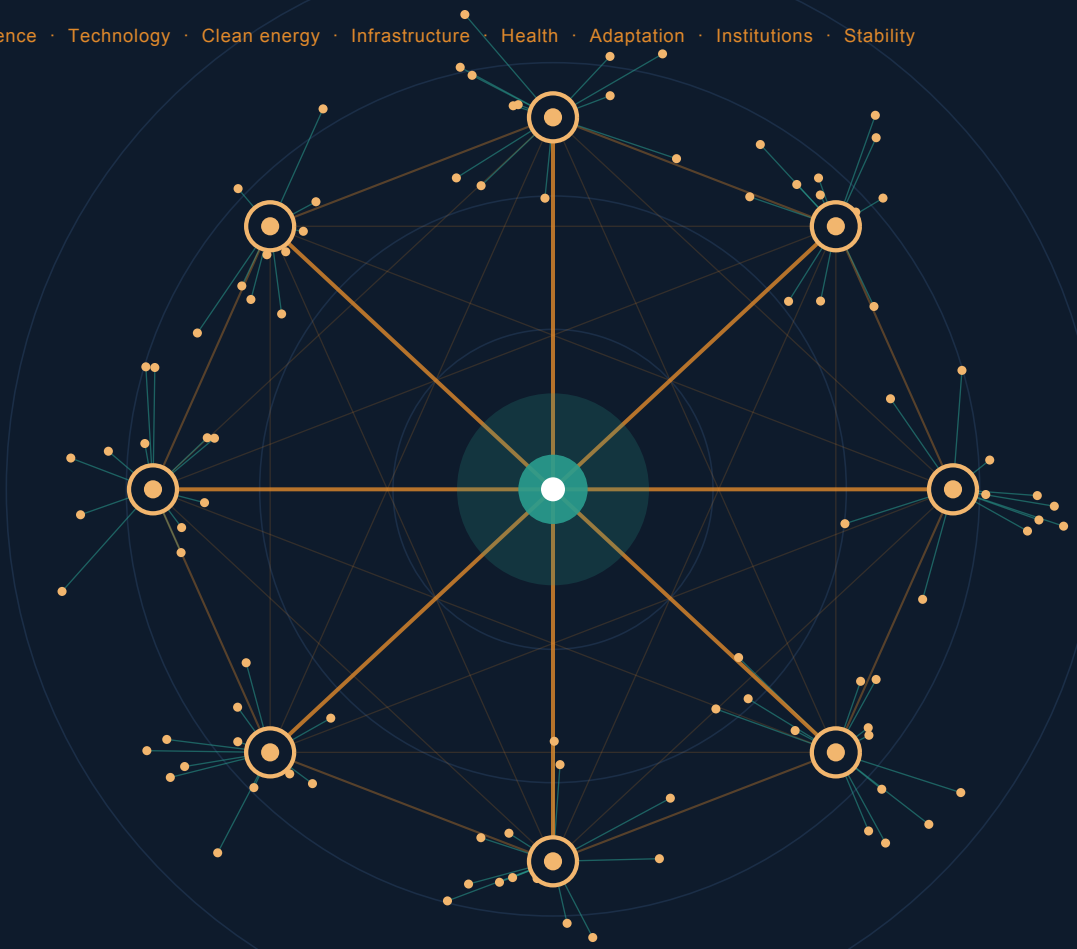
RESEARCH REPORT · NOVEMBER 2026

Polycrisis Resilience

The Global South

How accelerated human development can become an instrument of polycrisis mitigation across Africa, Asia and beyond

Convergence · Technology · Clean energy · Infrastructure · Health · Adaptation · Institutions · Stability



Hunter Hughes

Founder, H Heuristics · A concept developed by Hunter Hughes

Contents

About This Report . . . 3
Executive Summary . . . 5
1. Development as a Resilience Strategy . . . 7
2. The Global South in the Polycrisis . . . 10
3. The Global South Polycrisis Resilience Architecture . . . 12
4. Eight Development Mechanisms . . . 14
5. Interactions: How the Mechanisms Reinforce One Another . . . 17
6. The Evidence: How Development Has Reduced Risk . . . 20
7. Technology Diffusion and Convergence: The Latecomer Dynamic . . . 22
8. Finance, Debt and the Cost of Capital . . . 24
9. Regional Lenses . . . 26
10. Measuring the Development Resilience Dividend . . . 28
11. Three Scenarios to 2050 . . . 31
12. Trade-offs, Critiques and Limits . . . 33
13. Action Agenda, Research Questions and Conclusion . . . 35
Glossary . . . 37
References . . . 38

About This Report

This report is part of the **Polycrisis Resilience** research series developed by Hunter Hughes, Founder of H Heuristics. The series defines Polycrisis Resilience as the capacity of people, communities, economies, institutions and interconnected systems to anticipate, withstand, adapt to, recover from and reduce the cascading and compounding effects of multiple interconnected crises. Earlier reports examined one mechanism of resilience at a time. This report turns to a place: the **Global South**, where the largest share of humanity lives, where exposure to interacting risks is often greatest, and where the largest gains in resilience may be available.

The central claim is that Polycrisis Resilience is not achieved exclusively through crisis response, emergency preparedness or adaptation. It can also be built through **accelerated human development**. For the Global South, that means treating poverty reduction, economic convergence, clean technology diffusion, infrastructure expansion, healthcare access and climate adaptation as interconnected components of one resilience strategy, rather than as separate programs competing for the same budget.

The report draws on published evidence from development economics, health, energy, climate and disaster-risk research and adds original H Heuristics concepts: a central proposition, an eight-mechanism architecture, a **Development Resilience Dividend** for measuring results, and three scenarios to 2050.

How to read this report

Each chapter opens with a short summary box and can be read on its own. **Chapters 1 and 2** set out the idea and the exposure of the Global South. **Chapters 3 to 5** present the architecture of eight mechanisms and how they interact. **Chapters 6 to 9** examine the evidence, the role of technology diffusion and convergence, the finance constraint and regional differences. **Chapters 10 and 11** propose a measurement framework and three scenarios. **Chapters 12 and 13** cover trade-offs, critiques and an action agenda. Readers short of time can read the Executive Summary and Chapter 1.

A note on terms

Global South is a convenient shorthand, not a precise category. It covers more than 130 low- and middle-income countries in Africa, Asia, Latin America and the Caribbean and the Pacific, with very different incomes, institutions and risks. China and India, small island states and fragile and conflict-affected states face different problems, and Chapter 9 treats the differences seriously. Where a source reports on a narrower group, such as sub-Saharan Africa or low- and middle-income countries (LMICs), the narrower term is used.

Evidence grades

Claims are graded on the four-level scale used across H Heuristics research. The grade describes the state of knowledge, not the importance of the claim. Illustrative analyses by H Heuristics are always grade C or D.

Table 1. Evidence grades used in this report

Grade	Meaning	Example from this report
A: Established	Confirmed by multiple independent lines of evidence and reported by leading scientific or statistical bodies.	About 2.1 billion people lack safely managed drinking water (WHO and UNICEF, 2025).
B: Well supported	Strong evidence from several lines of work, with some unresolved detail or range.	Early warning systems and shelters cut cyclone deaths sharply.
C: Plausible or contested	A credible argument with partial evidence; specialists disagree on size or mechanism.	The eight mechanisms reinforce one another more than they compete.
D: Speculative	A scenario or hypothesis offered for evaluation, labeled as such.	That a Development Resilience Dividend can be estimated usefully.

Source: H Heuristics.

Illustrative exhibits. Four exhibits are H Heuristics constructions rather than reported data, and each is labeled where it appears. **Figure 2** and **Figure 4** are conceptual diagrams (grade C). **Figure 3** rests on qualitative scores assigned by the author from the literature (grade C). **Figure 8** is a schematic with no data. **Figure 9** is a stylized model that shows how mechanisms combine, not a forecast (grade D). Every other figure reports data from the cited source.

How to cite. Hughes, H. (2026). *Polycrisis Resilience: The Global South.* H Heuristics Research Report, November 2026.

Executive Summary

The central thesis

The Global South will be one of the most consequential arenas in determining humanity's ability to navigate the global polycrisis this century. Climate change, air pollution, poverty, inadequate infrastructure, demographic pressures, conflict, water insecurity and unequal access to technology create overlapping threats to human development and survivability. But the Global South is not simply a region of accumulated vulnerabilities. It is also where accelerated development, technological diffusion, economic convergence and institutional improvement could generate enormous resilience gains.

This report examines how **development itself can become an instrument of polycrisis mitigation**. The mechanisms usually described as economic objectives, namely convergence, technology diffusion, sustainable development and institutional capacity, also reduce how many people are exposed to harm and how badly they are hurt when it arrives.

> **THE CENTRAL H HEURISTICS PROPOSITION**
>
> Convergence, technological diffusion, sustainable development and institutional capacity-building are not merely economic objectives. They are mechanisms for reducing human exposure to interconnected global risks.

Key numbers

Table 2. The Global South in numbers

Number	What it measures	Source
3.3 to 3.6 billion	People living in contexts highly vulnerable to climate change; 2010 to 2020 deaths from floods, droughts and storms were 15 times higher in highly vulnerable regions than in very low-vulnerability ones	IPCC, 2023
About 7.9 million	Deaths linked to air pollution in 2023, including about 2.8 million from household air pollution	HEI, 2025
4.6 billion	People without full coverage of essential health services in 2023; 2.1 billion faced financial hardship from care costs	WHO and World Bank, 2025
2.1 and 3.4 billion	People without safely managed drinking water and sanitation in 2024	WHO and UNICEF, 2025
About 838 million	People below the $3.00 a day line in 2022, about two-thirds of them in sub-Saharan Africa	World Bank, 2025
$26 billion vs $310 to $365 billion	International public adaptation finance in 2023, against estimated annual adaptation needs of developing countries by 2035	UNEP, 2025
$921 billion	Net interest paid on public debt by developing countries in 2024; 3.4 billion people live in countries that spend more on interest than on health or education	UNCTAD, 2025
About 6x lower	Disaster mortality in countries with more comprehensive multi-hazard early warning, as reported by WMO	WMO, 2025

Sources as shown; figures are rounded. Several figures overlap and must not be added together.

Principal findings

- **Development deficits are resilience deficits.** Most of the gaps that define the Global South, in health coverage, sanitation, water, connectivity, energy and income, are also the conditions that turn hazards into disasters. Billions are exposed on several fronts at once (Chapter 2, grade A).
- **Eight development mechanisms carry the strategy:** economic convergence, technology diffusion, clean transition, infrastructure, human development, climate adaptation, institutional capacity and conflict resilience. Each reduces exposure or vulnerability directly, and each also strengthens the others (Chapters 3 and 4, grade C).
- **The mechanisms are interdependent.** In H Heuristics' qualitative assessment, 19 of 56 possible links between mechanisms are rated high-strength. Institutional capacity, economic convergence and infrastructure reach the most others. The same links can run in reverse, producing a development-risk trap (Chapter 5, grade C).
- **Development has already reduced risk at scale.** Cyclone deaths in Bangladesh and Odisha fell by orders of magnitude between the 1970s and 2010s as warning systems, shelters and rural income improved, and under-five mortality has fallen by more than half since 2000. Capability reduces harm, though no single driver explains it (Chapter 6, grade B).
- **Latecomers can move faster than pioneers.** Africa's solar module imports rose about 60% in the year to June 2025, and mobile technology helped lift women's account ownership in low- and middle-income countries from 37% to 73% between 2011 and 2024. Diffusion can compress decades into years where finance and institutions allow (Chapter 7, grade B).
- **Finance is the binding constraint.** The gap between adaptation needs and flows is 12 to 14 times current flows, debt service now exceeds what many countries spend on health or education, and the cost of capital for clean projects in emerging and developing economies is more than twice that in advanced ones (Chapter 8, grade B).
- **Growth does not automatically produce resilience.** Economic growth that places assets and people in floodplains, locks in pollution or concentrates gains can increase exposure. The framework evaluates development by what it does to risk, not by its pace alone (Chapters 10 and 12, grade B).
- **The combination matters most.** In a stylized model, an integrated scenario that pairs development with adaptation, health and institutions ends 2050 with a vulnerability index of 75 against 148 for growth alone and 161 for stalled development (Chapter 11, grade D).

What this report proposes

- An eight-mechanism **Global South Polycrisis Resilience Architecture** built on the central proposition.
- A **Development Resilience Dividend** that measures reductions in exposure, vulnerability and premature mortality attributable to accelerated development, separating observed outcomes from modeled counterfactuals.
- Three scenarios, a **Development Resilience Test** of seven questions, and an action agenda for governments, funders, companies and researchers.

What remains unsettled

The framework claims a direction, not a magnitude. How much of the observed fall in disaster and disease mortality is due to development, as against technology, aid or luck, is debated. Growth can raise exposure as well as capacity, and climate hazard is set largely by emissions elsewhere, so development can lower vulnerability but not remove risk. Chapter 12 sets out these limits.

PART I · THE IDEA

1. Development as a Resilience Strategy

IN BRIEF

- Resilience is usually pursued through response, preparedness and adaptation. Accelerated human development is a fourth route, and often the largest.
- Development lowers exposure and vulnerability before a shock and builds the capacity to recover afterward.
- The Global South has the most to gain, because the gap between present and achievable conditions is widest.

1.1 Three familiar routes, and a fourth

Most discussion of resilience in the Global South concerns three activities. **Crisis response** delivers relief after a shock: food aid, emergency health care, reconstruction finance. **Preparedness** readies people and institutions through contingency plans, stockpiles, evacuation routes and early warning. **Adaptation** adjusts systems to expected climate, for example through flood defenses, drought-tolerant crops or heat action plans. All three are essential.

They share a limitation: each begins from a given level of vulnerability and tries to manage the consequences. A household without safe water, a clinic without electricity and a government that spends more on interest than on health give even well-designed response and preparation little to work with. Raising the starting point, by lifting incomes, supplying clean energy, extending health and water services and strengthening institutions, changes what every shock does to a society.

This is the fourth route: **resilience through accelerated human development**. It supports the other three, because development supplies the money, skills, infrastructure and institutions they depend on, and lowers the baseline of harm they have to manage.

Polycrisis Resilience through Development

H Heuristics proposed concept

The reduction of a society's exposure and vulnerability to interacting crises, and the growth of its capacity to absorb and recover from them, through accelerated gains in income, technology access, infrastructure, health, education, institutions and stability. It treats poverty reduction, economic convergence, clean technology diffusion, infrastructure expansion, healthcare access and climate adaptation as one strategy.

1.2 The central proposition

> **THE CENTRAL H HEURISTICS PROPOSITION**
>
> Convergence, technological diffusion, sustainable development and institutional capacity-building are not merely economic objectives. They are mechanisms for reducing human exposure to interconnected global risks.

The proposition has two halves. The first is *risk reduction*: development lowers the number of people in harm's way and the severity of harm when hazards strike. A household with a brick home on a drained street, a health insurance card and a mobile money account is far less exposed to a flood than a household without them. The second is *capacity building*: development expands what societies can do, because richer, healthier and better-governed countries can finance and run adaptation, absorb losses and recover faster.

The IPCC offers an anchor for the claim. Its Sixth Assessment Report found that regions and people with considerable development constraints have high vulnerability to climatic hazards, and that between 2010 and 2020 human mortality from floods, droughts and storms was 15 times higher in highly vulnerable regions than in regions of very low vulnerability. Vulnerability, in that account, is largely a development outcome (grade A).

1.3 Why the Global South

Three features make the Global South the decisive arena. The first is **scale**. Emerging and developing economies hold about two-thirds of the world's people, and nearly all of the growth in population to mid-century will occur there. Where and how that growth is housed, powered, fed and governed will shape global exposure to climate, pollution and disease for decades.

The second is **distance to the frontier**. Because many countries still lack basic infrastructure and services, the marginal gains from each added unit of development are large. Raising a household from no electricity to reliable power changes health, income and safety far more than adding a similar unit to a household that already has it. The third is **timing**. Many Global South economies are building their grids, cities, factories and health systems now, which means choices made this decade will be locked in for fifty years. Building resilience in is cheaper than retrofitting it later (grade B).

1.4 How the strategy expresses the six properties

The Polycrisis Resilience framework is defined by six properties. **Table 3** shows how development-based resilience expresses each, and where it falls short if done poorly.

Table 3. Development-based resilience viewed through the six defining properties

Property	How development expresses it	Where it can fall short
Multidimensional	Acts on income, health, energy, water, connectivity and governance together.	Pursuing GDP growth alone and ignoring health, pollution or inequality.
Preventative	Lowers exposure and vulnerability before shocks arrive.	Treating development as a substitute for emergency preparedness.
Developmental	Builds incomes, skills and productive capacity that outlast any one crisis.	Imported projects that leave little local capability.
Intersectional	One investment, such as rural electrification, reduces several vulnerabilities.	Single-sector programs with unpriced side effects.

Property	How development expresses it	Where it can fall short
Distributive	Spreads benefits to those who are most exposed.	Gains captured by cities, elites or already-connected regions.
Long-term	Avoids lock-in to fragile or polluting infrastructure.	Short financing horizons and electoral cycles.

Source: H Heuristics, building on the six defining properties in the founding Polycrisis Resilience report.

1.5 What the proposition claims, and what it does not

A good proposition is specific enough to be wrong. **Table 4** states what this one does and does not claim.

Table 4. Reading the central proposition

The proposition claims that	The proposition does not claim that
Accelerated development lowers exposure and vulnerability to many risks together.	Growth by itself produces resilience. Growth can raise exposure.
Development is a resilience investment, and should be assessed as one.	Emergency response, preparedness and adaptation are less important.
The mechanisms reinforce one another and can form a virtuous spiral.	The spiral is automatic. It can stall, or run in reverse.
Latecomers can sometimes advance faster than pioneers by adopting proven tools.	Technology transfer is sufficient without finance and institutions.
Development can reduce vulnerability to hazards whose cause lies elsewhere.	Development removes climate risk. Emissions mitigation remains essential.

Source: H Heuristics.

PART I · THE IDEA

2. The Global South in the Polycrisis

IN BRIEF

- Climate change, air pollution, poverty, inadequate infrastructure, demographic pressure, conflict, water insecurity and unequal access to technology overlap in the Global South.
- Many of the deficits that define these risks affect billions of people at once, and they often fall on the same households.
- These are shared causes and shared victims, which is why one development program can act on several risks.

2.1 Eight overlapping pressures

A polycrisis is a cluster of related crises in several systems that, together, produce harms larger than any one of them would alone. **Table 5** lists eight pressures that overlap in much of the Global South, with an evidence point for each. The list is not exhaustive and the pressures differ in weight from one country to another.

Table 5. Eight overlapping pressures in the Global South

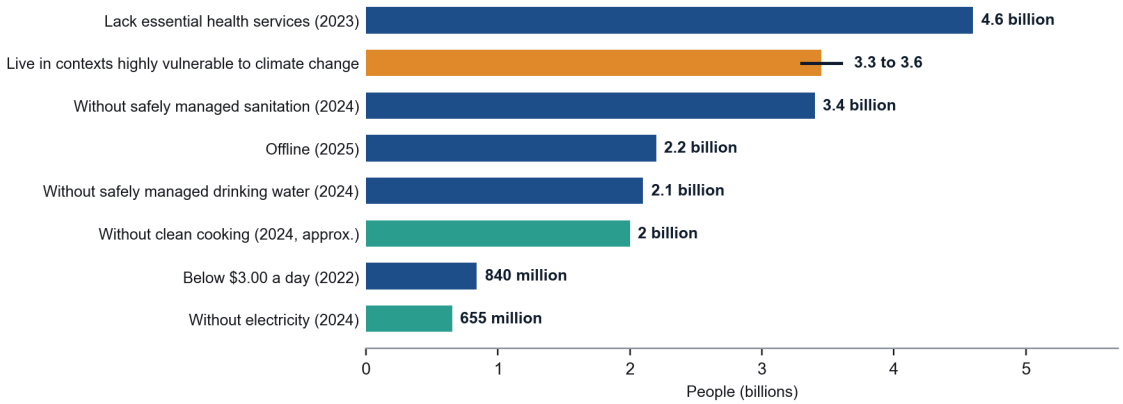
Pressure	How it appears	Evidence
Climate change	Heat, floods, drought and storms hit people with the least cushion.	About 3.3 to 3.6 billion people live in contexts highly vulnerable to climate change (IPCC, 2023).
Air pollution	Smoke from cooking, vehicles, industry and burning.	About 7.9 million deaths in 2023 were linked to air pollution, 2.8 million from household air pollution (HEI, 2025).
Poverty	Low income and thin savings leave no buffer.	About 838 million people lived below $3.00 a day in 2022; about two-thirds were in sub-Saharan Africa (World Bank, 2025).
Inadequate infrastructure	Missing water, sanitation, power, transport and connectivity.	2.1 billion lack safely managed drinking water and 3.4 billion lack safely managed sanitation (WHO and UNICEF, 2025); about 655 million lack electricity (SEforALL et al., 2026).
Demographic pressures	Rapid population and urban growth, often unplanned.	Urban populations are projected to rise from 56% to 68% of the world total by 2050, mostly in Africa and Asia (UN-Habitat, 2022).
Conflict and displacement	Violence destroys assets, services and trust.	About 117.8 million people were forcibly displaced at the end of 2025, most hosted in low- and middle-income countries (UNHCR, 2026).
Water insecurity	Scarcity, contamination and variability.	1.7 billion lack basic hygiene services at home (WHO and UNICEF, 2025).
Unequal access to technology	Connectivity, finance and energy tools reach some and not others.	2.2 billion people are offline, 96% of them in low- and middle-income countries (ITU, 2025).

Sources as shown. The UNHCR hosting share is for low- and middle-income countries; narrower groups host smaller shares.

2.2 The deficits in numbers

Figure 1 puts the scale of the main development deficits side by side. The bars are not additive. A person without sanitation is often also without safe water, a clinic and an income buffer, and the overlap is what makes the situation dangerous: the households with the least are exposed to several hazards at once, and the households that lack one service tend to lack others.

Figure 1. The scale of development deficits, in people



Sources: WHO and World Bank (2025); WHO and UNICEF (2025); IPCC (2023); ITU (2025); SEforALL et al. (2026); World Bank (2025). Clean cooking is rounded to about 2 billion. Bars overlap and are not additive.

2.3 Shared causes and shared victims

The pressures are connected in three ways. The first is **shared causes**. Poverty and a lack of clean energy keep households burning solid fuels, which causes indoor air pollution. Missing infrastructure raises both disease risk and flood losses. Weak public finances limit spending on health, adaptation and security at once. The second is **shared victims**. The same households tend to bear several risks: a family in an informal settlement may live on a floodplain, without piped water, with a charcoal stove and a precarious income.

The third is **cascades**. A drought raises food prices, which drives migration and strains cities. A flood contaminates water, which spreads disease and overloads clinics already short of power and medicines. Debt service crowds out the spending that would have reduced the damage. A problem treated in one system can reappear in another unless the shared cause is addressed.

2.4 The same facts, read the other way

The deficits are also the opening. Each one is a place where a proven solution exists and has already been delivered to other populations at scale. Electricity reaches about 92% of the world's people, under-five mortality has fallen by more than half since 2000, and mobile payments reach people who never held a bank account. The question is less whether such solutions work than how fast they spread, how they are financed and how they are combined.

Reading the evidence

Throughout this report, "exposure" means the number of people and assets in harm's way, "vulnerability" means how badly they are hurt when a hazard strikes, and "adaptive capacity" means the ability to adjust, cope and recover. Development can act on all three, but it can also increase exposure, for example by putting new assets on a floodplain. Chapter 12 returns to this.

PART II · THE ARCHITECTURE

3. The Global South Polycrisis Resilience Architecture

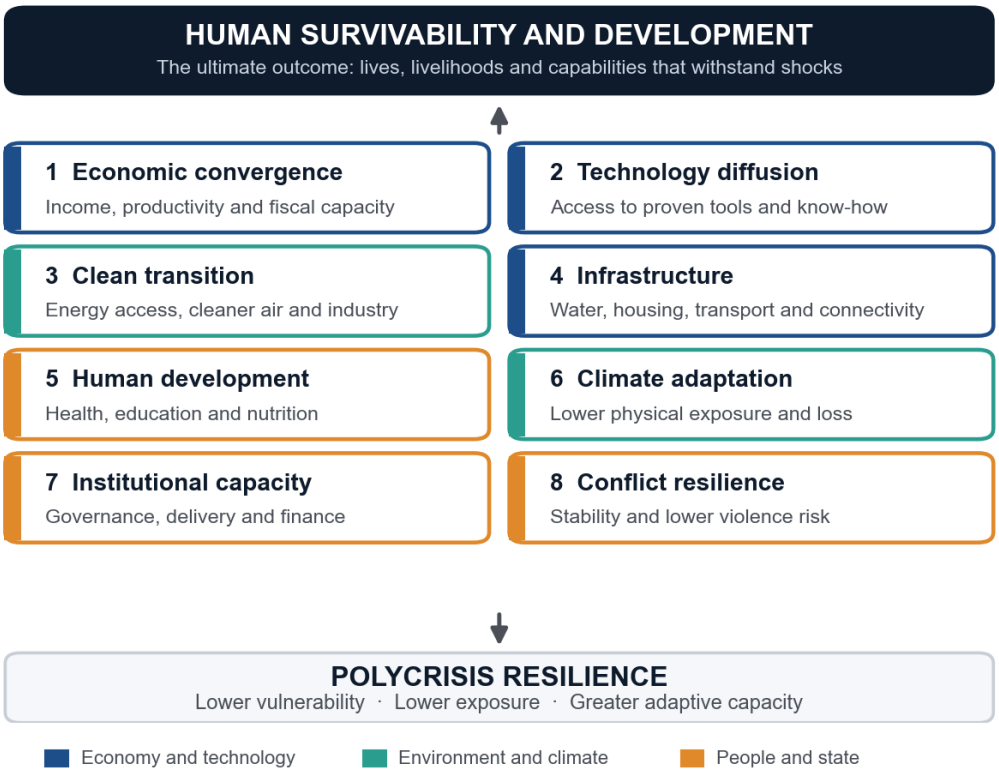
IN BRIEF

- The framework treats resilience as an outcome of interacting development processes, not a standalone policy objective.
- Eight mechanisms sit between present conditions and the outcome of human survivability and development.
- Each acts on exposure, vulnerability or adaptive capacity, and most act on more than one.

3.1 Resilience as an outcome

Most resilience programs treat resilience as something to be added to a development program, such as a flood-proofing component in a road project. The architecture proposed here reverses the relationship. Resilience is the *outcome* that results when several development processes advance together. **Figure 2** shows the structure: eight mechanisms in the middle, human survivability and development at the top as the ultimate outcome, and Polycrisis Resilience at the base as the condition they create, expressed as lower vulnerability, lower exposure and greater adaptive capacity.

Figure 2. The Global South Polycrisis Resilience Architecture



Source: H Heuristics conceptual model (grade C). The numbering is used throughout the report. Colors group the mechanisms by domain.

3.2 Three ways a mechanism can help

Each mechanism strengthens resilience in at least one of three ways. It can **reduce exposure**, by moving people and assets out of harm's way or removing the hazard at its source, as clean cooking removes smoke from the kitchen. It can **reduce vulnerability**, by limiting the damage a given hazard does, as sanitation limits the spread of disease after a flood. And it can **build adaptive capacity**, by increasing the resources, skills and institutions available to cope and recover, as higher incomes and better public finance do.

This three-way test is used in the profiles in Chapter 4 and underlies the measurement framework in Chapter 10. It keeps attention on what actually changes for people, rather than on the activity of the program.

3.3 The eight mechanisms at a glance

Table 6. The eight development mechanisms

Mechanism	What it is	Main resilience effect
1. Economic convergence	Poorer economies catching up in income, productivity and capability.	Builds household and fiscal capacity to absorb and finance recovery.
2. Technology diffusion	Proven tools, from solar panels to mobile money, spreading beyond where they were invented.	Delivers capability quickly and cheaply; shortens the path to services.
3. Clean transition	Energy access and cleaner energy, cooking, industry and transport.	Cuts pollution and fuel-price exposure; powers clinics, pumps and firms.
4. Infrastructure	Water, sanitation, housing, transport, power grids and connectivity.	Reduces disease and disaster losses and keeps services running in a shock.
5. Human development	Health, education, nutrition and skills.	Builds the human capital that adapts and rebuilds; lowers mortality.
6. Climate adaptation	Early warning, resilient design, water management and risk-aware planning.	Directly lowers physical exposure and loss.
7. Institutional capacity	Governance, public finance, service delivery and implementation.	Turns money and plans into results; enables coordination and recovery.
8. Conflict resilience	Stability, social cohesion and lower violence risk.	Protects the gains of the other seven and avoids displacement.

Source: H Heuristics.

3.4 Why an architecture and not a list

Lists of development priorities are common, and they invite a familiar contest in which each sector argues for its share. An architecture says something more: that the mechanisms depend on one another, that some are foundations for others, and that the order and combination of investments matter. A clinic with no power, a solar mini-grid with no one trained to repair it, and a flood early-warning system that residents do not trust each fail for reasons that lie in another box of the diagram. Chapter 5 maps these dependencies.

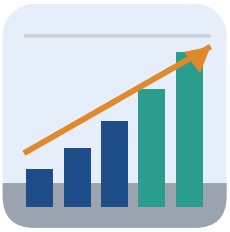
PART II · THE ARCHITECTURE

4. Eight Development Mechanisms

IN BRIEF

- Each mechanism is profiled with its contribution to resilience, the evidence behind it, and its main caveat.
- Evidence is strongest for human development, infrastructure and early warning, and thinner for institutional and conflict channels.
- No mechanism is sufficient alone; Chapter 5 shows how they combine.

Each profile gives a short description, the way the mechanism contributes to resilience, the evidence for it, and the caveats that apply. Evidence grades follow the scale in the front matter.



MECHANISM 1

Economic Convergence

Poorer economies closing the gap in income, productivity and capability with richer ones, and households moving out of poverty.

Resilience contribution: *Higher income gives households savings, insurance and the means to move or rebuild, and gives governments the revenue to protect and invest.*

Evidence. Studies of growth find that unconditional convergence, poor countries growing faster than rich ones, appeared from the 1990s and strengthened after 2000 (Kremer, Willis and You, 2021). At the household level, poverty is strongly associated with who is hurt in a disaster. Grade B.

Caveat. Convergence is uneven. The World Bank counts 108 middle-income countries, and only 34 moved to high income between 1990 and 2023. Sub-Saharan Africa holds most of the world's extreme poor and its share is rising. Growth can also raise exposure if assets accumulate in hazardous places.



MECHANISM 2

Technology Diffusion

The spread of proven technologies, from solar panels and mobile money to vaccines and satellite forecasting, beyond the places that invented them.

Resilience contribution: *Diffusion delivers capability faster and cheaper than building it from scratch, and lets countries skip stages of development.*

Evidence. Africa's solar module imports rose about 60% to roughly 15 GW in the year to June 2025, and 25 countries imported at least 100 MW, up from 15 a year earlier (Ember, 2025). Women's account ownership in low- and middle-income countries rose from 37% to 73% between 2011 and 2024 (World Bank, 2025). Grade B.

Caveat. 2.2 billion people remain offline, and only 23% of residents of low-income countries use the internet against 94% in high-income countries (ITU, 2025). Imported technology without local repair, finance and regulation can fail within years.



MECHANISM 3

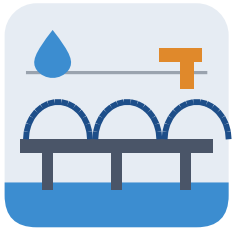
Clean Transition

Access to electricity and the shift to cleaner energy, cooking, industry and transport.

Resilience contribution: *Clean energy lowers air pollution and fuel-price exposure, and powers clinics, water pumps, cold chains and businesses.*

Evidence. Air pollution was linked to about 7.9 million deaths in 2023, including about 2.8 million from household air pollution (HEI, 2025). About 655 million people lack electricity and about 2 billion lack clean cooking (SEforALL et al., 2026). Solar is now often the cheapest new generation. Grade A for the health burden, B for the cost advantage.

Caveat. Clean energy investment is concentrated in a few markets; Africa received about 3% of global energy investment in 2026 with about 20% of the world's people (IEA, 2026). The report *Polycrisis Resilience: Clean Transition* examines this mechanism in depth.



MECHANISM 4

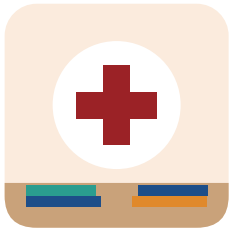
Infrastructure

Water, sanitation, housing, roads, power grids and connectivity: the physical systems on which everything else runs.

Resilience contribution: *Infrastructure removes sources of disease, keeps services running in a shock, and sets how many people live in harm's way.*

Evidence. 2.1 billion people lack safely managed drinking water, 3.4 billion lack safely managed sanitation and 1.7 billion lack basic hygiene at home (WHO and UNICEF, 2025). Cities in Africa and Asia will absorb most of the roughly 2.2 billion people added to the world's urban population by 2050 (UN-Habitat, 2022). Grade A for the gaps, B for the benefits.

Caveat. Infrastructure built without risk-aware design can become a hazard in its own right, and long-lived assets lock in choices for decades. Maintenance is chronically underfunded.



MECHANISM 5

Human Development

Health, education, nutrition and skills: the capabilities of people.

Resilience contribution: *Healthy, educated people earn more, adapt more readily and recover faster; health systems that work in normal times are the front line in a crisis.*

Evidence. The global under-five mortality rate fell 52% between 2000 and 2023, to 37 deaths per 1,000 live births, though 4.8 million children still died before age five in 2023 (UN IGME, 2024). Even so, 4.6 billion people lack full coverage of essential health services and 2.1 billion face financial hardship from health costs (WHO and World Bank, 2025). Grade A.

Caveat. Progress has slowed: the pace of reduction in child mortality has fallen sharply since 2015, and only one-third of countries improved both coverage and financial protection.



MECHANISM 6

Climate Adaptation

Early warning, climate-resilient design, water management and risk-aware land use that reduce physical exposure and loss.

Resilience contribution: *Adaptation directly lowers the harm from hazards that development alone cannot remove.*

Evidence. The Global Commission on Adaptation estimated that investing $1.8 trillion in five areas between 2020 and 2030 could yield $7.1 trillion in net benefits, with benefit-cost ratios from 2:1 to above 10:1 (GCA, 2019). Disaster mortality is nearly six times lower in countries with more comprehensive multi-hazard early warning (WMO, 2025). Grade B.

Caveat. International public adaptation finance was $26 billion in 2023 against estimated needs of $310 to $365 billion a year by 2035, and 59% of it is debt (UNEP, 2025).



MECHANISM 7

Institutional Capacity

Governance, public finance, service delivery and the ability to turn plans and money into results.

Resilience contribution: *Capable institutions coordinate response, deliver services at scale, collect revenue and keep trust through a crisis.*

Evidence. Cross-country studies find that, for a given hazard, richer countries with better institutions suffer far fewer deaths (Kahn, 2005). The World Bank's analysis of the middle-income trap stresses policy and state capability alongside investment as the constraint on further growth (World Bank, 2024). Grade B for the channel, C for the size.

Caveat. Institutions are slow to build and hard to measure, and external pressure to reform can backfire. Capacity is local; it cannot simply be imported.



MECHANISM 8

Conflict Resilience

Stability, social cohesion and the capacity to manage tensions without violence.

Resilience contribution: *Stability protects every other gain, and conflict is the fastest way to lose them: it destroys assets, closes clinics and displaces populations.*

Evidence. About 117.8 million people were forcibly displaced at the end of 2025, and low- and middle-income countries host most of the world's refugees (UNHCR, 2026). Conflict and climate stress interact in some settings, though the evidence for a direct causal link is mixed. Grade B for the harms, C for the causal channel.

Caveat. Development can raise tension if gains are distributed unfairly, and outsiders have limited influence on conflict dynamics.

PART II · THE ARCHITECTURE

5. Interactions: How the Mechanisms Reinforce One Another

IN BRIEF

- The mechanisms are connected by many strong links, and the connections matter as much as the mechanisms.
- Institutional capacity, economic convergence and infrastructure reach the most other mechanisms in H Heuristics' qualitative assessment.
- The same links can run in reverse and produce a development-risk trap; policy has to be judged against both loops.

5.1 Examples of reinforcement

The important distinction is that the mechanisms reinforce one another. Four examples show how:

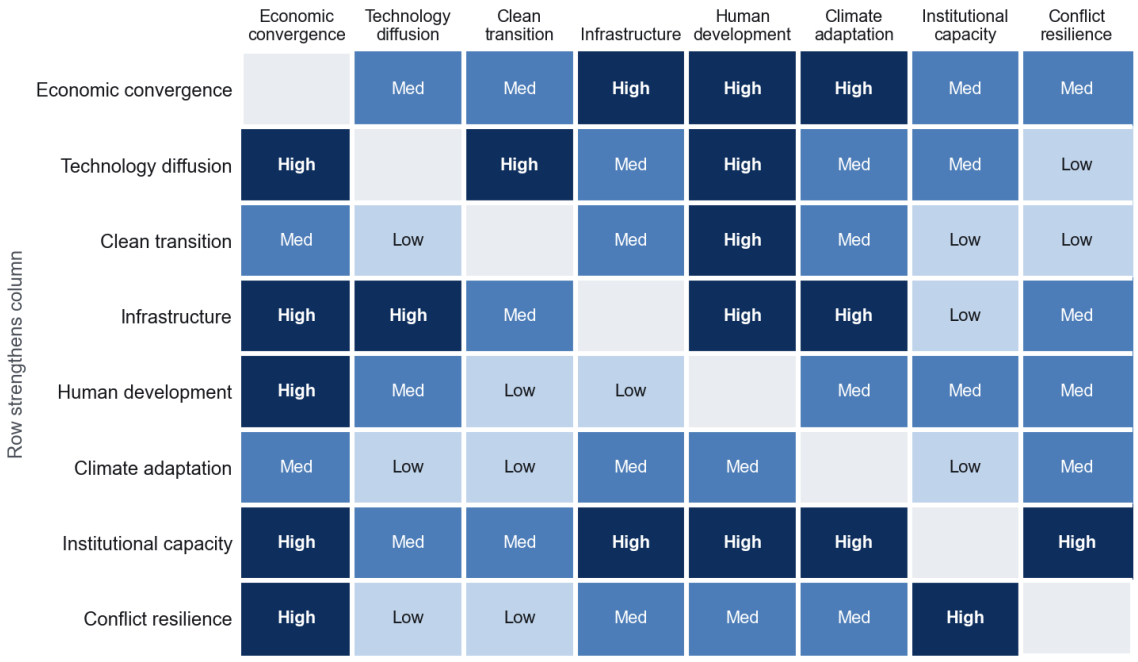
- **Clean electrification** improves air quality, energy security, productivity and the capacity of clinics, pumps and schools to function.
- **Digital diffusion** improves agricultural efficiency, education, financial inclusion and the reach of disaster warnings.
- **Economic convergence** expands the fiscal and household resources available for adaptation and recovery.
- **Better urban planning** reduces exposure to heat, flooding, pollution and infrastructure failure at the same time.

This is the intersectional dimension of the framework: because the mechanisms feed one another, a coordinated program can deliver more than the sum of separate ones, and a failure in one can hold back the rest.

5.2 An interaction map

Figure 3 scores how strongly each mechanism strengthens each of the others, on a scale of low, medium and high. The scores are the author's judgment from the literature (grade C) and are meant to prompt testing, not to be taken as measurements. Of 56 possible links, 19 are rated high-strength. By total outgoing strength, **institutional capacity** (19), **economic convergence** (17) and **infrastructure** (17) reach the most others. By total incoming strength, **economic convergence** (19) and **human development** (19) benefit most from the rest, which fits their role as the nearest to the final outcome.

Figure 3. Interaction map: how strongly each mechanism strengthens the others



Source: H Heuristics qualitative scores (illustrative, grade C), based on the literature cited in this report. Scores are 0 (none, blank), 1 (low), 2 (medium) and 3 (high).

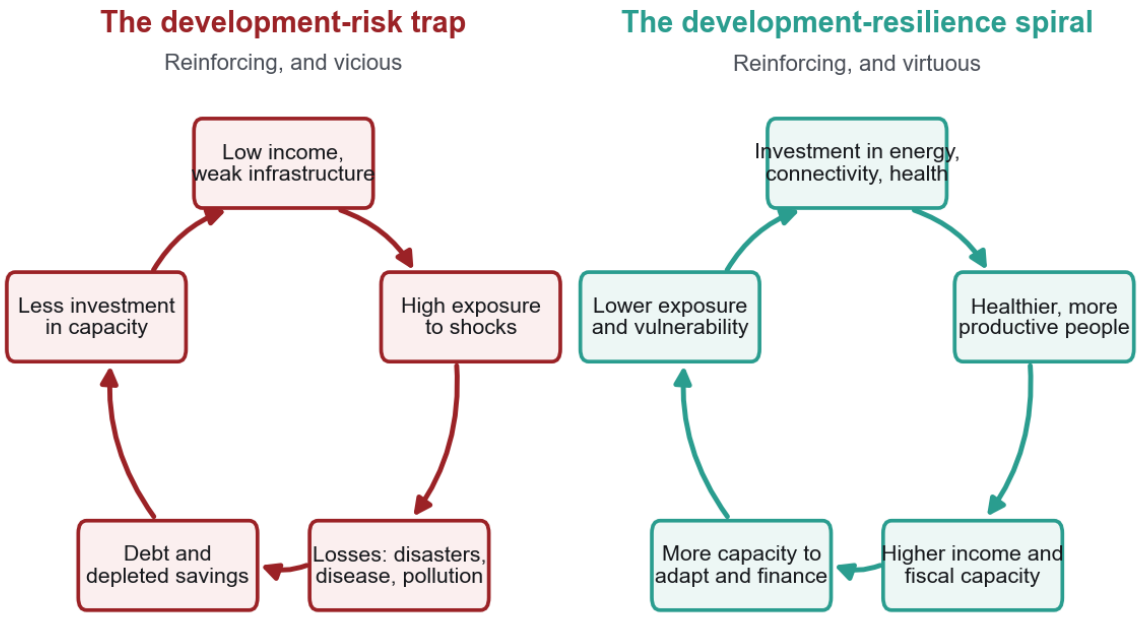
Two readings stand out. First, institutional capacity is a foundation: it appears to strengthen nearly every other mechanism strongly. That matches the finding of the World Bank's work on the middle-income trap that growth past a certain income depends on institutions and not on capital alone. Second, climate adaptation has the lowest outgoing score. It protects the others, but it does not build them. That is a reason to fund it, because nothing else delivers the protection, and a reason not to expect it to carry the development agenda alone.

5.3 Two loops: the trap and the spiral

The links form loops. In the **development-risk trap**, low income and weak infrastructure produce high exposure to shocks, the losses from shocks deplete savings and add to debt, and the resulting shortage of funds prevents the investment that would reduce exposure. Each turn of the loop leaves a society poorer and more fragile. Evidence for it comes from the way repeated shocks deepen poverty and from debt service that rises as climate losses and borrowing costs grow.

In the **development-resilience spiral**, investment in energy, connectivity and health makes people healthier and more productive, income and fiscal capacity rise, a society can pay for more adaptation and further investment, and exposure and vulnerability fall. **Figure 4** shows both. The point of the framework is to move countries from the first loop to the second, and the same factors can push in either direction, and what decides the direction is whether the first links are strengthened.

Figure 4. The development-risk trap and the development-resilience spiral



Source: H Heuristics conceptual model (grade C). Each link is supported by evidence cited in this report, but the full loops are not directly measured.

5.4 Where to start

The loops suggest that where a program starts matters. Three principles follow, each a hypothesis for testing (grade C):

- **Start where several links meet.** Investments that serve many mechanisms at once, such as clinic electrification, rural connectivity or urban drainage and sanitation, offer the best returns on resilience per dollar.
- **Do not neglect the foundation.** Institutional capacity has the widest reach and is the slowest to build, so it needs early and sustained support, not an afterthought.
- **Protect gains.** Conflict resilience and climate adaptation guard the investment already made; they are cheap insurance on a larger asset.

PART III · EVIDENCE AND FINANCE

6. The Evidence: How Development Has Reduced Risk

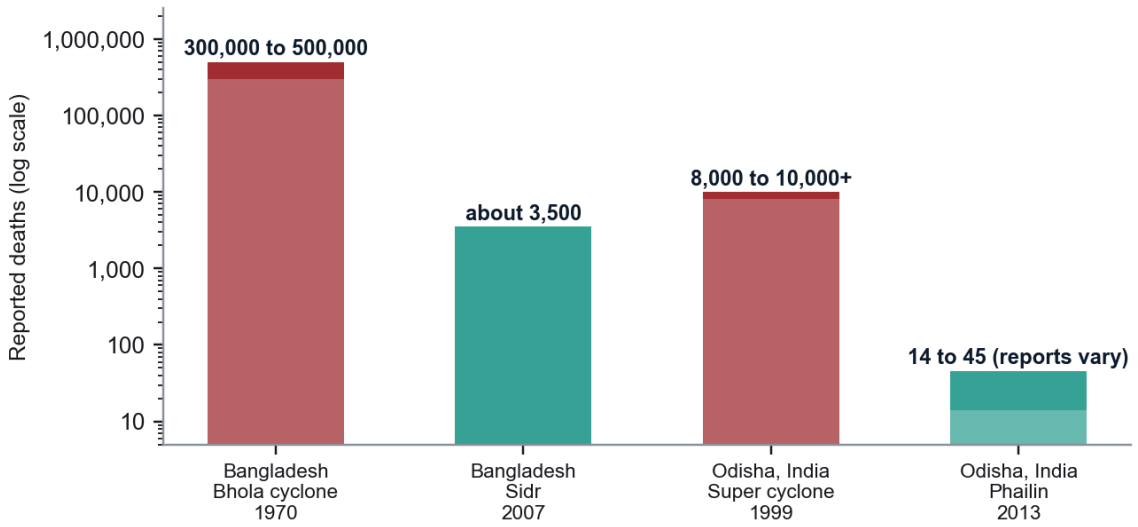
IN BRIEF

- The strongest evidence that development lowers risk comes from outcomes that have already changed: cyclone deaths, child mortality and early-warning coverage.
- Targeted capability, such as warnings, shelters and volunteers, can cut deaths sharply even before incomes rise much.
- The evidence shows association and plausible mechanisms, not a precise share of credit for development.

6.1 A natural experiment in cyclones

Storm surges from the Bay of Bengal killed an estimated 300,000 to 500,000 people in Bangladesh in the 1970 Bhola cyclone. Cyclone Sidr, a very intense storm that struck in 2007, killed about 3,500. On India's east coast, the 1999 super cyclone killed more than 8,000 and perhaps over 10,000 people in Odisha, while Cyclone Phailin in 2013 killed a few tens, between 14 and 45 in different reports, even though nearly 900,000 people were moved to shelters beforehand. **Figure 5** shows the contrast on a logarithmic scale.

Figure 5. Reported deaths in paired cyclone events



Sources: reported death tolls compiled from news and agency reports for Bhola (1970), Sidr (2007), the Odisha super cyclone (1999) and Phailin (2013). Estimates vary by source; the paler lower band shows the low end of a range. The storms differ in strength, track and landfall, so the comparison is illustrative.

Reports on these events point to a similar set of causes: forecasting and warnings that reached people, large networks of trained volunteers, hundreds of purpose-built cyclone shelters, evacuation plans that were enforced, and better roads and communications. Many of these are capability investments in public services and institutions, and some were made when Bangladesh and Odisha were still poor. That is an important point for the framework: **targeted capacity can lower mortality faster than average income rises**. It also means that resilience can be bought, in part, with development spending that is not labeled as climate spending (grade B).

6.2 Health and the long fall in child deaths

The global under-five mortality rate fell 52% between 2000 and 2023 and stood at 37 deaths per 1,000 live births, but 4.8 million children still died before their fifth birthday in 2023 (UN IGME, 2024). The service coverage index for essential health services rose from 54 to 71 between 2000 and 2023 (WHO and World Bank, 2025). These gains came from several developments: vaccines, clean water, nutrition, primary care, women's education and rising incomes. Their relative weights are debated, but each is a development input, and none is an emergency response.

The same data show how much remains. 4.6 billion people lack full coverage of essential health services, 2.1 billion experience financial hardship when they seek care, and progress on child mortality has slowed since 2015. A pandemic, a heatwave or a flood meets a health system with these gaps, which is why development in health is also a form of pandemic and disaster preparedness (grade A for the gaps, B for the link).

6.3 Early warning and the limits of the numbers

The WMO's 2025 status report finds that 119 countries, about 60%, now report multi-hazard early warning systems, a record, and that the comprehensiveness of systems in the least developed countries has roughly doubled. Small island developing states have the lowest coverage at 43%, and risk knowledge remains the least developed element. WMO also reports that disaster mortality is nearly six times lower in countries with more comprehensive systems.

That last figure is an association. Countries with better warning systems are also richer and better governed, so some of the difference reflects those traits rather than the warning systems alone. A fair reading is that early warning is among the most cost-effective adaptation measures, as the Global Commission on Adaptation concluded, and that the six-fold gap is evidence of the combined effect of capability and income, not a measure of the effect of warnings by themselves.

6.4 What the evidence shows

Table 7. Summary of evidence for development as risk reduction

Claim	Key evidence	Grade
Vulnerability is largely a development outcome.	Mortality from floods, droughts and storms 15 times higher in highly vulnerable regions (IPCC, 2023).	A
Targeted capacity cuts disaster deaths sharply.	Bangladesh and Odisha cyclone mortality fell by orders of magnitude.	B
Health progress is a development outcome with resilience value.	Under-five mortality down 52% since 2000; service coverage index up from 54 to 71.	B
Better early warning is associated with lower mortality.	About six times lower mortality where systems are more comprehensive (WMO, 2025); confounded by income.	B
Adaptation and resilience investment pays.	Benefit-cost ratios of 2:1 to over 10:1 in five areas (GCA, 2019).	B
Institutional capacity is a strong cross-cutting factor.	Cross-country studies of disaster mortality and growth (Kahn, 2005; World Bank, 2024).	B/C
Development can be tuned to cut risk faster.	Plausible and partly demonstrated, but no direct estimate of its size.	C

Sources as shown. Grades follow the scale in the front matter.

PART III · EVIDENCE AND FINANCE

7. Technology Diffusion and Convergence: The Latecomer Dynamic

IN BRIEF

- Latecomers can adopt proven technologies without repeating the costs of invention, and some are doing so at remarkable speed.
- Solar in Africa and Pakistan and mobile finance across low- and middle-income countries show diffusion in practice.
- Diffusion builds resilience only when finance, skills, standards and institutions are in place to use the technology.

7.1 The latecomer advantage

Economic historians since Alexander Gerschenkron (1962) have argued that economies that industrialize late can grow faster than pioneers, because they can borrow existing technology and institutions and skip stages. The modern version of the argument is that the cost and lag of diffusion have fallen. A solar panel designed in one country is made in another and installed on a rooftop in a third within months, and a payments system that took decades to build in rich economies can be switched on over mobile networks.

For resilience, the advantage is specific. Technologies that reduce exposure, such as clean cooking, solar power, mobile warnings, digital health and cash transfers, can be adopted without waiting for the whole of an economy to grow into them. Diffusion therefore works as a shortcut, and it makes the development-resilience spiral in Chapter 5 faster to enter.

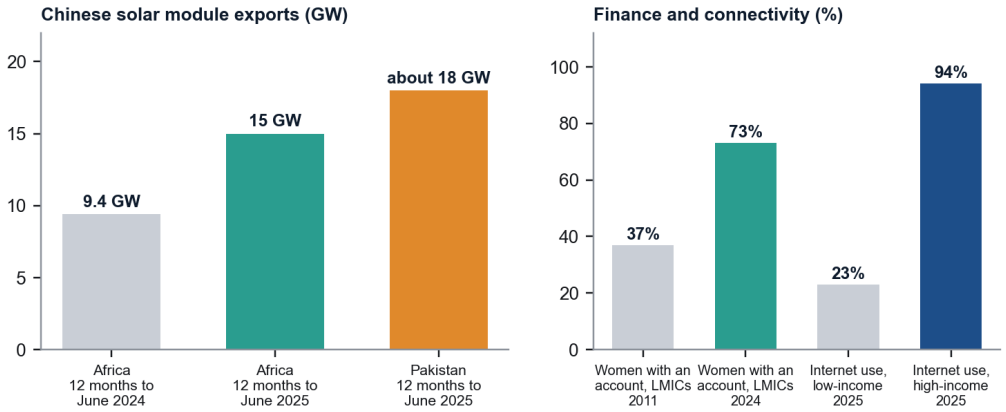
7.2 Evidence of take-off

Figure 6 shows two sets of data. In energy, Africa's imports of Chinese-made solar modules rose about 60% to roughly 15 GW in the 12 months to June 2025, and imports into African countries other than South Africa nearly tripled in two years, from 3.7 GW to 11.2 GW. Pakistan imported about 18 GW in the same period, more than the whole of Africa. The value of petroleum imports exceeded that of solar imports by factors of 30 to over 100 in each of the top ten importing countries (Ember, 2025). Much of it is distributed and privately financed, so it moves faster than public programs.

In finance, 75% of adults in low- and middle-income economies had an account in 2024, up six points in three years. Women's account ownership roughly doubled from 37% in 2011 to 73% in 2024, and 42% of adults made a digital merchant payment in 2024, up from 35% in 2021 (World Bank, 2025). Mobile money use is the highest in the world in sub-Saharan Africa. Accounts allow savings, remittances and fast cash transfers after a shock.

The unfinished work is large: 2.2 billion people are offline (ITU, 2025).

Figure 6. Evidence of diffusion in energy, finance and connectivity



Sources: Ember (2025), based on Chinese customs export data, which measure shipments, not installed capacity; Pakistan is about 18 GW per Ember; World Bank (2025), Global Findex; ITU (2025). LMICs: low- and middle-income countries.

7.3 Convergence and the middle-income trap

Diffusion supports convergence, and convergence is what ultimately funds resilience. Kremer, Willis and You (2021) find that poor countries began to converge on rich ones from the 1990s and more clearly after 2000, helped by better policies and institutions. The picture is less encouraging at the top of the middle-income range. The World Bank's *World Development Report 2024* found that 108 countries were middle-income at the end of 2023, and that only 34 middle-income economies moved to high income between 1990 and 2023. Many stall at about a tenth of US income per person.

The implication is twofold. Low-income countries need basic services and early technology adoption, where diffusion is strongest. Middle-income countries need institutional upgrades, innovation and cleaner industry, where domestic capability matters more.

7.4 When diffusion builds resilience, and when it does not

Table 8. Conditions for diffusion to build resilience

Condition	Why it matters	Example of failure
Finance	Most clean and digital technologies have high upfront costs and low running costs.	Projects stall because the cost of capital is more than twice as high as in advanced economies.
Skills and repair	Technology that cannot be maintained fails within years.	Mini-grids and pumps abandoned after the first fault.
Standards and regulation	Quality, safety and recycling protect users and the environment.	Poor-quality equipment, battery and electronic waste.
Inclusion and grids	Women, rural and poor households need power, connectivity and markets.	Services that reach only the connected.
Local capability	Domestic firms and workers capture value and sustain the system.	Dependence on a single foreign supplier.

Source: H Heuristics, drawing on the sources in this report.

PART III · EVIDENCE AND FINANCE

8. Finance, Debt and the Cost of Capital

IN BRIEF

- Finance is the binding constraint on the strategy, and the money is flowing the wrong way in important respects.
- Adaptation finance is a fraction of need, debt service exceeds health or education spending in dozens of countries, and capital costs are more than double those in advanced economies.
- Lowering the cost of capital may be the single most leveraged way to speed up the strategy.

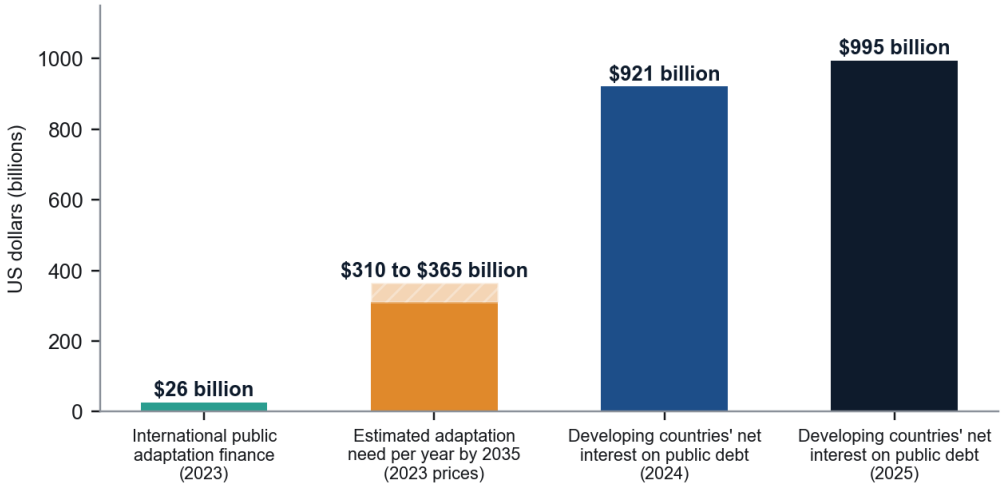
8.1 The adaptation gap

UNEP's *Adaptation Gap Report 2025* estimates that developing countries will need about $310 billion a year by 2035 for adaptation on modeled costs, and about $365 billion a year when extrapolated from their own plans, in 2023 prices. International public adaptation finance was $26 billion in 2023, down from $28 billion the year before. The gap is 12 to 14 times current flows. The Glasgow goal of doubling adaptation finance by 2025 is expected to be missed, and 59% of the finance provided is in the form of debt, which adds to the burden it is meant to relieve (UNEP, 2025).

8.2 Debt service competes with development

UNCTAD's *A World of Debt 2025* reports that developing countries paid $921 billion in net interest on public debt in 2024, a rise of about 10% in a year. In 46 developing countries, interest payments exceeded spending on health or education, and 3.4 billion people live in those countries. A record 61 countries spent 10% or more of government revenue on interest. UNCTAD's later update puts net interest at about $995 billion in 2025, with 51 countries and 3.7 billion people in the position of paying more on interest than on health or education, and estimates that developing countries could save about $500 billion a year if they borrowed at rates comparable to those paid by advanced economies. **Figure 7** sets these flows against adaptation needs.

Figure 7. Adaptation finance, adaptation needs and debt service



Sources: UNEP (2025); UNCTAD (2025; 2026 update). Needs are estimated annual needs by 2035 in 2023 prices; the hatched band is the upper estimate. Years differ across bars.

The figure is a comparison, not an accounting identity: debt service and adaptation are different budget lines, and the debt was often incurred for valid reasons. But it shows why the strategy cannot rest on domestic budgets alone. A country that spends more on interest than on health struggles to build the clinics, drainage and warning systems that would lower its risk, and the losses may add to its debt: the trap of Chapter 5 in fiscal form.

8.3 The cost of capital

The IEA found that the cost of capital for clean energy projects in emerging and developing economies is more than twice as high as in advanced economies, which can make otherwise attractive projects uneconomic (IEA, 2024). Clean and resilient infrastructure is capital-intensive and cheap to run, so high financing costs fall hardest on the investments that lower long-run risk. Africa, with about 20% of the world's people, drew about 3% of global energy investment in 2026 (IEA, 2026).

8.4 Levers

Table 9. Levers for lowering the cost of capital for resilience investment

Lever	How it works	Evidence grade
Concessional and blended finance	Public funds absorb first losses or lower rates to attract private capital.	B
Guarantees and currency hedging	Reduce perceived risk and exchange-rate exposure for long-lived assets.	B
Multilateral lending reform	More lending capacity per unit of capital, with longer terms.	C
Climate-resilient debt clauses	Pause repayments after a disaster so recovery is not choked by debt.	C
Debt restructuring and swaps	Reduce debt service in exchange for resilience spending.	C
Domestic resource mobilization	Higher, fairer tax collection and better spending.	B
Programmatic platforms	Aggregate small projects into investable portfolios.	C

Source: H Heuristics, drawing on IEA (2024), UNCTAD (2025) and UNEP (2025). Grades reflect strength of evidence that the lever works at scale.

National governments control domestic revenue, regulation and delivery; external actors control concessional finance, guarantees and the rules of the international system. A strategy that has only one of these will move slowly or fail to turn money into results.

PART III · EVIDENCE AND FINANCE

9. Regional Lenses

IN BRIEF

- The mechanisms are common, but the dominant pressures and the best starting points differ by region.
- Large emerging economies are both Global South members and sources of technology and finance for others.
- Fragile and conflict-affected states and small islands need different sequences.

9.1 Six regions and a special case

Table 10 gives a qualitative reading of where the dominant pressures lie and which mechanisms offer the best leverage in each region. It is a starting point for hypotheses, not a diagnosis, and every region contains countries that differ sharply from the regional picture (grade C).

Table 10. Regional lenses on development-based resilience

Region	Dominant pressures	Promising leverage	Main caution
Sub-Saharan Africa	Extreme poverty, rapid population growth, energy and health gaps, debt.	Distributed solar and clean cooking; primary care; urban water and sanitation; digital finance.	Finance and the cost of capital; institutional depth.
South Asia	Heat, floods, severe air pollution, dense cities, groundwater stress.	Clean cooking and power; early warning; urban drainage; heat action.	Monsoon variability; pollution lock-in from coal and biomass.
Southeast Asia	Coastal and delta flooding, fast urbanization, industrial growth.	Risk-aware planning; clean industry; coastal protection.	Subsidence and sea level; informal settlements.
Latin America and the Caribbean	Urban inequality, storms and drought, slow growth, violence.	Urban upgrading; social protection; grid and storage expansion.	Stagnant productivity; weak revenue; crime.
Middle East and North Africa	Water scarcity, extreme heat, conflict, hydrocarbon dependence.	Water efficiency and reuse; solar-powered supply; diversification.	Conflict; fiscal exposure to fuel markets.
Small island states and least developed countries	Sea level, storms, high debt, disaster losses large relative to GDP.	Early warning (lowest coverage in small islands at 43%); concessional finance; resilient design.	Scale; limited capacity; debt.
Fragile and conflict-affected states	Violence, displacement, collapsed services.	Conflict resilience first; basic services; humanitarian-development links.	Aid dependence; limited absorptive capacity.

Source: H Heuristics qualitative assessment (grade C), using evidence cited in this report. The small-island early-warning coverage is from WMO (2025).

9.2 China, India and South-South flows

Two features complicate any regional reading. First, the largest economies in the Global South are not only recipients of diffusion but its source. China's manufacturing scale has made solar panels, batteries and electric vehicles cheaper everywhere, and the African and Pakistani solar surge shown in Chapter 7 rests largely on Chinese exports. India has built digital public infrastructure, including payments and identity systems, that other countries are now adapting. South-South cooperation is therefore part of the diffusion mechanism, a theme that H Heuristics examines in a separate report.

Second, the benefits of diffusion are shaped by who controls supply chains. Dependence on a few manufacturers or lenders is itself a risk, and a resilient strategy should seek multiple suppliers, local assembly and open standards where it can.

9.3 Sequencing in fragile settings

In fragile and conflict-affected states, the architecture's order of priorities shifts. Stability comes first because gains made without it can be lost quickly, and institutional capacity is the scarcest input. The most feasible development gains may be those that do not depend on strong central institutions: off-grid solar, mobile money, community health workers and local water systems. These can build resilience and goodwill together, though they are not a substitute for the state functions that only a government can provide.

PART IV · MEASUREMENT AND FUTURES

10. Measuring the Development Resilience Dividend

IN BRIEF

- The framework should move beyond describing development activities and evaluate their actual contribution to reducing risk.
- A Development Resilience Dividend measures reductions in exposure, vulnerability and premature mortality attributable to accelerated development.
- Estimates must separate observed outcomes from modeled counterfactuals and must not assume that growth automatically produces resilience.

10.1 Measurement dimensions

A resilience dividend needs indicators across several dimensions. **Table 11** lists eight, with illustrative indicators. Many are already collected by international agencies, so the framework can build on existing data.

Table 11. Potential measurement dimensions

Dimension	Illustrative indicators
Environmental	PM2.5 exposure, emissions, water quality
Economic	GDP per capita, productivity, poverty
Energy	Electricity access, clean cooking, renewable share
Health	Avoidable mortality, healthcare access
Climate	Heat exposure, flood risk, adaptation capacity
Infrastructure	Water, sanitation, transport, connectivity
Human development	Education, nutrition, life expectancy
Institutional	Public capacity, service delivery, stability

Source: H Heuristics. Indicators are illustrative; the choice should be matched to context.

10.2 A proposed concept

Development Resilience Dividend

H Heuristics proposed concept

The reduction in human suffering, premature mortality, exposure and systemic vulnerability that can be attributed to accelerated development interventions, compared with a credible counterfactual.

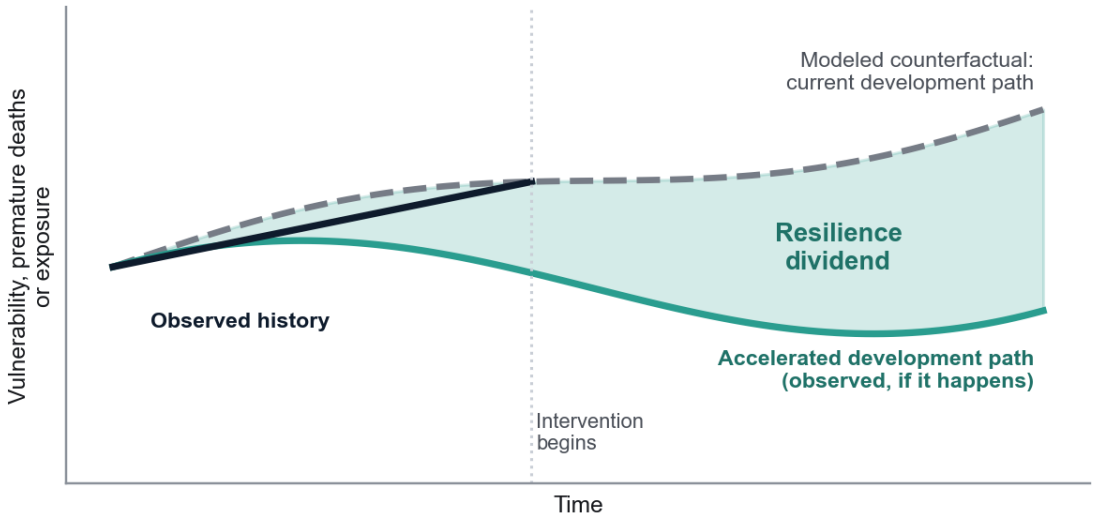
It extends two earlier ideas: the *resilience dividend* (Rodin, 2014), the benefits that resilience building brings in normal times as well as in crises, and the *triple dividend of resilience* (Tanner et al., 2015), which counts avoided losses, economic gains and social and environmental co-benefits.

An especially valuable research objective would be estimating the potential reduction in human suffering, premature mortality and vulnerability attributable to accelerated development interventions. Such estimates would let funders compare, for example, a clean-cooking program, a primary-care expansion and a drainage project on the same scale: lives and livelihoods protected per dollar.

10.3 Observed outcomes and modeled counterfactuals

The dividend is a difference between two paths: what happens with the intervention, and what would have happened without it. The first can be observed. The second cannot, and must be modeled. **Figure 8** shows the idea. Because the counterfactual is an estimate, the framework requires that observed outcomes and modeled counterfactuals be reported separately, with the method and its uncertainty stated.

Figure 8. The Development Resilience Dividend as the gap between two paths



Source: H Heuristics schematic (no data). The shaded area is the dividend: the difference between the modeled counterfactual and the observed accelerated path.

Established methods can be used to estimate it. They include difference-in-differences and synthetic control studies of comparable countries, microsimulation of health programs, catastrophe models of disaster losses, and integrated assessment models of climate and development pathways. Each has limits, and the credible approach is to use several and compare them.

10.4 Principles

- **Do not assume that growth produces resilience.** Growth is an input, and the test is the change in exposure, vulnerability and mortality, not the change in GDP.
- **Avoid double-counting.** A health gain that also raises income should be counted once. Overlapping benefits must be netted.
- **Report distribution.** An average gain can hide a loss for the most exposed, and the dividend should be reported for the poorest and most vulnerable groups.
- **Show uncertainty.** Ranges and sensitivity tests should accompany every central estimate.
- **Label grades.** Estimates should carry the evidence grade of their weakest link.

10.5 A ledger for the dividend

Table 12. Components of a Development Resilience Dividend ledger

Component	What is counted	Typical metric
Avoided premature deaths	Deaths prevented from disasters, disease and pollution	Deaths, years of life lost
Avoided exposure	People or assets moved out of harm's way	People, share of population
Avoided losses	Reduced damage to homes, income and infrastructure	Currency value, share of GDP
Capacity gained	Higher income, skills and services that persist	Income, coverage, years of schooling
Recovery speed	Time to restore services and livelihoods	Days to restoration
Co-benefits	Gains in health, environment and equity from the same investment	Disability-adjusted life years, emissions

Source: H Heuristics. Items are counted once; overlaps are netted.

PART IV · MEASUREMENT AND FUTURES

11. Three Scenarios to 2050

IN BRIEF

- Three stylized scenarios show how mechanisms can combine: stalled development, growth-first and integrated resilience.
- Growth alone ends 2050 with a vulnerability index of 148, close to stalled development at 161, while the integrated path reaches 75.
- The scenarios are a thought experiment with chosen parameters, not forecasts.

11.1 Why scenarios

The interaction between mechanisms makes it hard to reason about outcomes from first principles. Scenarios give a way to see how choices combine. The three below differ in two things: how much development capacity is built, and how much exposure grows. Global hazard is identical in all three, because climate hazard is set largely by emissions that the Global South does not control. The only difference lies in what the region does about it.

SCENARIO A

Stalled Development

Convergence slows, public finances remain strained, and investment in infrastructure, health and institutions grows slowly. Population and urban growth continue, so exposure rises with them.

Potential outcome: *Capacity rises only from 30 to 38; exposure rises by about 35%; vulnerability reaches 161 in 2050.*

SCENARIO B

Growth-First Development

Income rises faster and capacity improves, but growth is not guided by risk. Assets and people concentrate in floodplains and coastal zones, pollution-intensive industry expands and institutions lag.

Potential outcome: *Capacity rises to 55, but exposure rises by about 70%; vulnerability reaches 148, only modestly better than stalled development.*

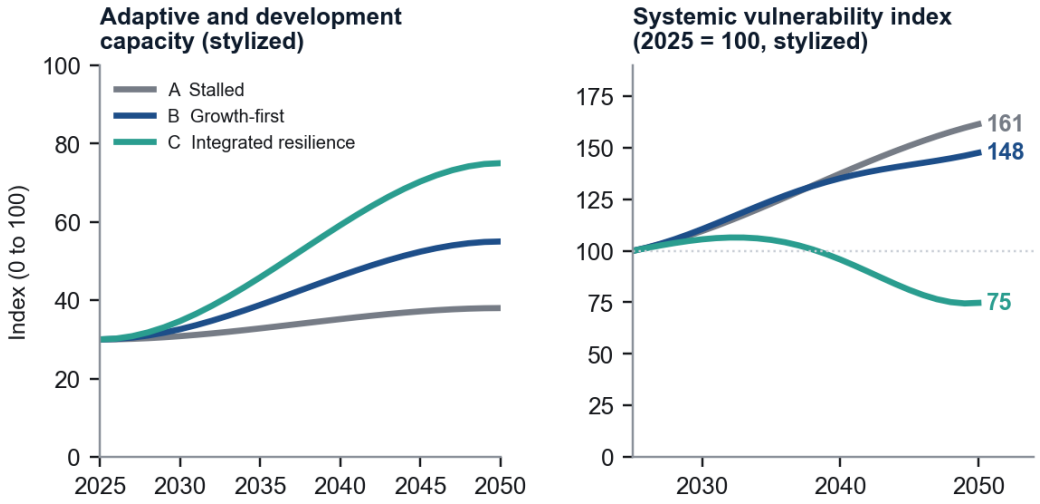
SCENARIO C

Integrated Resilience Development

Growth is paired with adaptation, clean energy, health, water, risk-aware planning and institutional investment, supported by lower financing costs. Exposure still rises with population but more slowly.

Potential outcome: *Capacity rises to 75, exposure rises by about 55%; vulnerability falls to 75, below its 2025 level.*

Figure 9. Three stylized trajectories to 2050



Source: H Heuristics stylized model (grade D). Not a forecast. Vulnerability = hazard x exposure x (1 - capacity), indexed to 2025 = 100; hazard rises 35% by 2050 in all scenarios; capacity and exposure follow S-curves toward the end values in the text.

11.2 What the model shows, and what it does not

The model's message is simple. Vulnerability is the product of three things, and development acts on two of them in opposite directions: it raises capacity, which lowers vulnerability, and it can raise exposure, which raises it. Growth that builds capacity but ignores exposure (Scenario B) barely improves on standing still. Growth that builds capacity and manages exposure (Scenario C) cuts vulnerability by a quarter from its 2025 level, and by about 27% cumulatively over 2025 to 2050 compared with Scenario A, in index terms.

The result depends on the assumptions, and readers should test them. If growth-first development did not raise exposure beyond the population-driven rise in Scenario A, its 2050 index would be about 117; and if the integrated path faced the same exposure as stalled development, its 2050 index would be about 65. In both cases the ordering of the scenarios is the same, but the size of the gap depends on how much growth raises exposure. That is an empirical question that the measurement framework in Chapter 10 is designed to answer.

Table 13. Scenario parameters, 2025 to 2050

Parameter	A: Stalled	B: Growth-first	C: Integrated
Capacity index, 2025 and 2050	30 and 38	30 and 55	30 and 75
Exposure multiplier, 2050	1.35	1.70	1.55
Hazard multiplier, 2050	1.35	1.35	1.35
Vulnerability index, 2050 (2025 = 100)	161	148	75

Source: H Heuristics stylized model (grade D). Parameters are chosen for illustration.

PART V · ACTION

12. Trade-offs, Critiques and Limits

IN BRIEF

- Development can raise exposure, lock in pollution, create debt and concentrate gains. The framework is only useful if it counts these costs.
- The strongest critiques concern attribution, heterogeneity and fairness, and each has a partial answer.
- A set of findings is listed that would cause H Heuristics to revise the framework.

12.1 Development can increase exposure

The most important trade-off is that growth puts more assets and people in harm's way. Cities expand onto floodplains and coasts, factories cluster in ports, and wealth produces larger losses in absolute terms even as the share of people killed falls. The 2050 scenarios show how much this can matter. The remedy is not slower development but better-guided development: risk-aware land use, building codes that are enforced, and infrastructure designed for future conditions.

12.2 Carbon lock-in and fairness

A development path that relies on coal, oil and gas would raise the hazards that Global South populations are most exposed to, and many clean options are now the cheapest sources of new energy. At the same time, the Global South's historical responsibility for emissions is small, and poorer countries should not carry the extra cost of a clean path alone. That is why finance (Chapter 8) is central. Mitigation in the largest emitting economies remains a precondition, because development cannot offset unlimited hazard.

12.3 Critiques and responses

Table 14. Main critiques of the framework

Critique	Response	What would change our mind
"Development" is vague and can justify anything.	The architecture names eight mechanisms and ties each to measurable exposure, vulnerability or capacity outcomes.	Evidence that the mechanisms cannot be distinguished or measured.
The Global South is too diverse for one framework.	The framework is a common structure with context-specific priorities (Chapter 9).	Evidence that mechanisms work in opposite ways across regions.
Attribution is impossible.	Counterfactual methods are imperfect but standard; the framework requires uncertainty to be shown.	Showing that no credible method can separate development effects from other factors.
Growth raises exposure and carbon.	True, and the framework counts exposure explicitly and prefers clean paths.	Evidence that exposure growth reliably outweighs capacity gains.
It shifts attention from emissions cuts and finance from rich countries.	The framework treats mitigation and finance as preconditions, not substitutes.	Evidence that it is used to reduce commitments.
Institutional capacity cannot be built from outside.	Agreed; the framework emphasizes domestic ownership and long time horizons.	Evidence that capacity programs consistently fail.

Source: H Heuristics.

12.4 Data and measurement limits

Many of the figures in this report are estimates with wide uncertainty. Poverty estimates are revised when price data are updated; the World Bank's change in the international poverty line to $3.00 a day in 2021 prices raised the estimated number of people in extreme poverty by roughly 125 million in 2022. Estimates of the number of people offline and of disaster deaths have also been revised. Vulnerability and resilience themselves have no single metric. Throughout, the report has tried to use primary sources and to state where figures differ.

12.5 What would revise the framework

- Credible evidence that development gains have not reduced disaster and disease mortality once income is controlled for.
- Evidence that, across many settings, growth-driven exposure consistently outweighs capacity gains.
- Evidence that the mechanisms are largely independent and that coordinated programs do no better than the sum of separate ones.
- Evidence that diffusion-driven gains are reversed by debt, dependence or governance failures at scale.

PART V · ACTION

13. Action Agenda, Research Questions and Conclusion

IN BRIEF

- Governments, funders, companies and researchers each have a distinct role.
- A Development Resilience Test of seven questions can screen programs.
- Development is not only the goal of resilience but one of its main instruments.

13.1 An agenda by actor

Table 15. Priority actions by actor

Actor	Priority actions
National governments	Screen development budgets for risk; enforce risk-aware land use and building codes; invest in institutions, statistics and local delivery; keep early warning and social protection as standing systems.
Development banks and funders	Lower the cost of capital with guarantees, longer terms and blended finance; raise grant and concessional adaptation finance; count resilience outcomes, not only disbursements.
Creditors and the international system	Ease debt service where it crowds out health, education and adaptation; adopt disaster-pause clauses; close the gap between adaptation needs and flows.
Companies and investors	Finance distributed energy, digital and water systems with local partners; build repair and supply capacity locally; share performance and risk data.
Researchers and statistical agencies	Develop and test the Development Resilience Dividend; improve small-area data on exposure and vulnerability; publish counterfactual methods and uncertainty.

Source: H Heuristics.

13.2 The Development Resilience Test

Table 16. The Development Resilience Test: seven questions to screen a program, budget or plan

#	Question	What a good answer shows
1	Does it lower exposure, vulnerability or build adaptive capacity?	A stated, measured effect on at least one.
2	Does it avoid raising exposure or locking in polluting or fragile infrastructure?	Land-use, design and clean-technology standards.
3	Does it serve several mechanisms or risks at once?	Links to at least two of the eight mechanisms.
4	Does it reach the most exposed households?	Targeting and distributional data.
5	Can it be financed, maintained and repaired locally?	A funded plan for the full life of the asset.
6	Does it strengthen, not bypass, public institutions?	Capacity left behind.
7	Can its effect be measured against a counterfactual?	Baseline data and a monitoring plan.

Source: H Heuristics.

13.3 Research questions

- How much of the fall in disaster and disease mortality since 1990 is attributable to development inputs, and which inputs matter most?
- How strongly do the eight mechanisms reinforce one another when measured with data, and where are the strongest links?
- How much does growth raise exposure, and which policies reduce that effect most cheaply?
- What is the Development Resilience Dividend per dollar for a clean-cooking program, a primary-care expansion, urban drainage and early warning?
- How much would lower capital costs speed up the strategy, and which instruments lower them most?
- Which sequences of investment work best in fragile and conflict-affected settings?
- How can diffusion be made more local and less dependent on a few suppliers?
- What indicators could make a Global South Polycrisis Resilience Index practical and comparable?

13.4 Conclusion

The Global South will be one of the most consequential arenas for how humanity handles the polycrisis. Its populations are the most exposed, its development gaps the largest, and its choices in the next two decades about energy, cities, health, technology and institutions will set risk for the world. The central proposition of this report is that those choices are resilience choices. Convergence, technology diffusion, sustainable development and institutional capacity-building are not merely economic objectives. They are mechanisms for reducing human exposure to interconnected global risks.

That does not make development a cure-all. Growth can raise exposure and carbon, and the money to act is scarce and costly. But it does change the question. Instead of asking only how much to spend on response and adaptation, we can ask how development itself can be steered so that it lowers risk while it raises incomes. The evidence in this report suggests that the answer is potentially large and still largely unmeasured. The most useful next step is to measure it.

> **CLOSING PROPOSITION**
>
> Polycrisis resilience is not achieved exclusively through crisis response, emergency preparedness or adaptation. It can also be built through accelerated human development.

Glossary

Adaptive capacity	The ability of people, institutions and systems to adjust to changing conditions, take advantage of opportunities and cope with consequences.
Cascade	The spread of failure or stress from one system to others through dependencies.
Clean transition	The shift from pollution-intensive and inefficient systems toward cleaner energy, industry, transportation, agriculture and infrastructure.
Convergence	The process by which poorer economies close the gap in income, productivity and capability with richer ones.
Cost of capital	The return that investors require to finance a project; higher costs make capital-intensive projects less viable.
Counterfactual	An estimate of what would have happened without an intervention, used to measure its effect.
Development-risk trap	A reinforcing loop in which low income and weak infrastructure produce losses that prevent investment in capacity (H Heuristics).
Development-resilience spiral	A reinforcing loop in which investment in capability raises income and capacity, lowering exposure and enabling further investment (H Heuristics).
Development Resilience Dividend	The reduction in human suffering, premature mortality, exposure and systemic vulnerability attributable to accelerated development, relative to a credible counterfactual (H Heuristics).
Early warning system	A system that monitors hazards, forecasts their impact, communicates warnings and prompts action.
Exposure	The people, assets and systems located where hazards can affect them.
Global South	A shorthand for low- and middle-income countries in Africa, Asia, Latin America, the Caribbean and the Pacific; not a precise category.
Institutional capacity	The ability of public organizations to govern, finance, deliver services and implement plans.
Middle-income trap	A pattern in which middle-income economies fail to move to high income, often stalling at about a tenth of US income per person.
Polycrisis	A cluster of related crises in several global systems that interact so that the overall impact exceeds the sum of the parts.
Polycrisis Resilience	The capacity of people, communities, economies, institutions and systems to anticipate, withstand, adapt to, recover from and reduce the cascading effects of multiple interconnected crises (H Heuristics).
Technology diffusion	The spread of proven technologies beyond the places that invented them.
Vulnerability	The degree to which people and systems are harmed when a hazard strikes.

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