H HEURISTICS

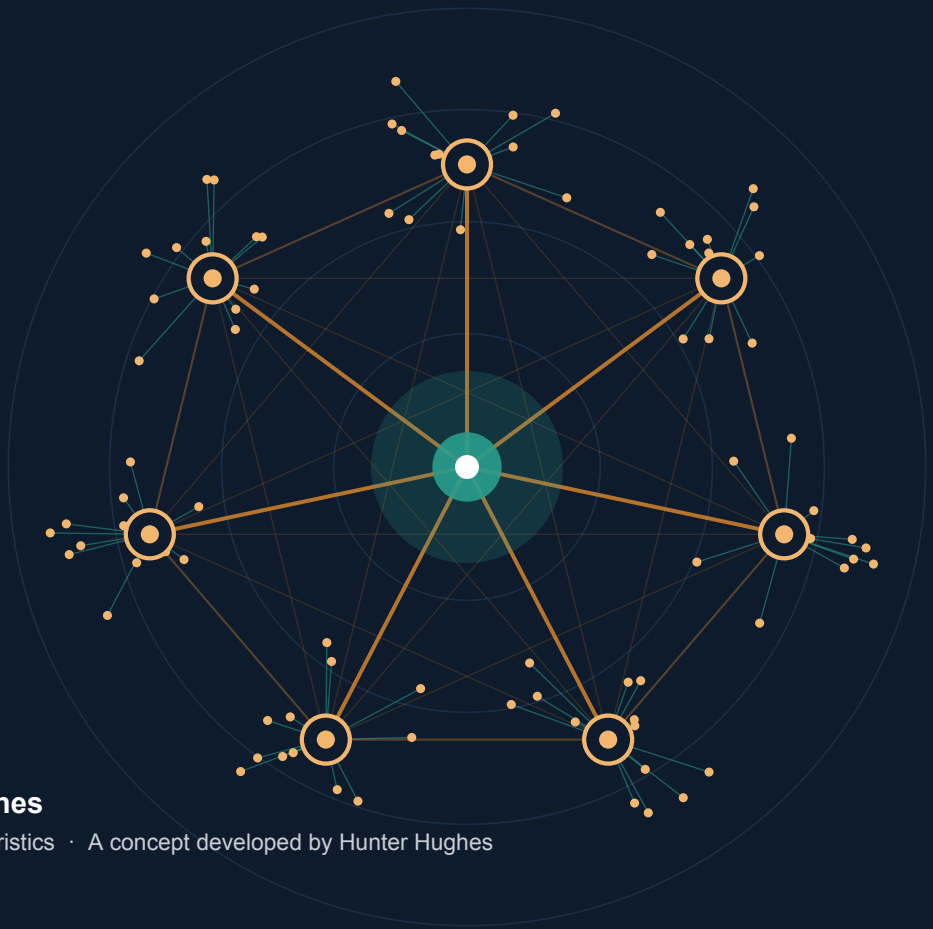
RESEARCH REPORT · NOVEMBER 2026

FOUNDATIONAL FRAMEWORK · 2000–2100 AND BEYOND

Polycrisis Resilience

Minimizing Human Suffering Over the Long Term

How economic convergence, innovation, clean transition, adaptation and institutions can reduce the human consequences of an interconnected world of risks



Hunter Hughes

Founder, H Heuristics · A concept developed by Hunter Hughes

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About This Report

This is the founding report of the **Polycrisis Resilience** research series developed by Hunter Hughes, Founder of H Heuristics. It sets out the framework in full: what Polycrisis Resilience is, why it takes the minimization of human suffering as its ultimate objective, the seven pillars through which it works, a way of measuring progress, and a century-long planning horizon. Later reports in the series take individual pillars, such as the clean transition or economic convergence, and examine them in depth.

The report asks one question. If humanity's largest risks are connected, and if the harm they cause accumulates across generations, what is the most useful way to organize the effort to reduce that harm? The answer proposed here is to treat economic development, technological diffusion, clean energy, climate adaptation, human development and institutional strength as *complementary mechanisms of a single purpose*, and to judge them by how much human suffering they prevent.

How to read this report

Each chapter opens with a short summary box and can be read on its own. **Chapters 1 and 2** define the framework and describe the interconnected risk structure it responds to. **Chapters 3 to 6** present the seven pillars, with extra space for economic convergence, which is the framework's most distinctive contribution. **Chapter 7** shows how the pillars reinforce one another, and where they pull apart. **Chapters 8 and 9** turn to measurement and to a planning horizon that runs to 2100 and beyond. **Chapters 10 and 11** set out limits, criticisms and an agenda for action. Readers short of time can read the Executive Summary and Chapter 1.

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. Original H Heuristics constructions 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 assessed as such by leading scientific or statistical bodies.	Air pollution is linked to about 7.9 million deaths a year.
B: Well supported	Strong evidence from several lines of work, with some unresolved detail or range.	Disaster losses are far larger once cascading effects are counted.
C: Plausible or contested	A credible argument with partial evidence; specialists disagree on size or mechanism.	Economic convergence reduces vulnerability to interconnected crises.
D: Speculative	A scenario or hypothesis offered for evaluation, labeled as such.	That cumulative human suffering avoided can be estimated usefully.

Source: H Heuristics.

Illustrative exhibits. Four exhibits are H Heuristics constructions, not reported data, and each is labeled where it appears. **Figure 3** and **Figure 6** rest on qualitative judgments by the author (grade C). **Figure 8** uses hypothetical numbers to show how cumulative suffering avoided could be calculated (grade D). **Figure 10** 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: Minimizing Human Suffering Over the Long Term.* H Heuristics Research Report, November 2026.

Executive Summary

The central thesis

Polycrisis Resilience is the effort to minimize human suffering, preserve human survivability and improve the long-term conditions of human civilization in an increasingly interconnected world of systemic risks. It reframes economic development, technological progress, innovation diffusion, climate adaptation and institutional capacity as interconnected mechanisms for reducing the human consequences of the global polycrisis.

> **THE CENTRAL PREMISE**
>
> The objective of resilience is not simply to help societies withstand crises. It is to reduce the amount of human suffering that occurs across generations by preventing risks, reducing exposure, expanding adaptive capacity and improving the conditions under which people live.

Key numbers

Table 2. The human stakes in numbers

Number	What it measures	Source
About 7.9 million	Deaths linked to air pollution in 2023	HEI, 2025
About 546,000	Heat-related deaths a year (2012–2021 average)	Lancet Countdown, 2025
About 4.8 million	Children who died before age five in 2023; nearly half in fragile and conflict-affected countries	UN IGME, 2025
About 4.6 billion	People not fully covered by essential health services	WHO and World Bank, 2025
About 2.3 billion	People moderately or severely food insecure in 2024, including about 673 million chronically hungry	FAO et al., 2025
About 2.1 billion	People without safely managed drinking water in 2024; 3.4 billion lack safely managed sanitation	WHO and UNICEF, 2025
About 118 million	People forcibly displaced at the end of 2025, the first fall in a decade	UNHCR, 2026
$2.3 trillion	Estimated yearly cost of disasters including cascading effects, against $202 billion in direct losses	UNDRR, 2025

Sources as shown; figures are rounded.

Principal findings

- **Suffering is the right unit of account.** Resilience defined only as the ability to withstand shocks can be satisfied by systems that protect institutions while people go on suffering. Defining the objective as reduced human suffering keeps attention on outcomes: deaths, disease, hunger, deprivation, displacement and lost opportunity (Chapter 1).
- **Risks are connected, and so are the people harmed by them.** Environmental pressures, socioeconomic vulnerabilities and destabilizing pressures interact and feed back on one another. The IPCC estimates that

3.3 to 3.6 billion people live in contexts that are highly vulnerable to climate change. Vulnerability, not hazard alone, is what turns an event into suffering (Chapter 2, grade B).

- **Seven pillars carry the framework:** clean transition, economic convergence, diffusion of innovations, climate and environmental adaptation, human development, conflict prevention and institutional resilience, and long-term survivability. Each reduces suffering through at least one of four mechanisms: preventing risks, reducing exposure, expanding adaptive capacity and improving living conditions (Chapters 3 to 6, grade C).
- **Economic convergence is a form of polycrisis mitigation.** Closing gaps in income, infrastructure and services reduces the structural vulnerability that lets crises compound. The proposed chain is convergence, reduced vulnerability, greater adaptive capacity, reduced suffering, with the condition that convergence must itself be clean and sustainable (Chapter 4, grade C).
- **The pillars reinforce one another.** In a qualitative assessment, economic convergence is the pillar that most strengthens the others and human development is the pillar most strengthened by them. Benefits can also run in reverse as vicious loops (Chapter 7, grade C).
- **A common metric is needed.** The proposed concept of **cumulative human suffering avoided** counts direct and indirect effects, weights them by distribution, shows uncertainty, and removes double-counting. In a hypothetical example, gross benefits of 156 units fall to 118 after overlap (Chapter 8, grade D).
- **Integration matters more than any single pillar.** In a stylized model to 2100, advancing all pillars together lowers cumulative suffering by about 46% against drift, while advancing only the clean transition and growth lowers it by about 28% (Chapter 9, grade D).

What this report proposes

- A shared **definition and central premise** that place the reduction of human suffering at the center of resilience.
- A **seven-pillar framework** and a map of how the pillars interact.
- The concept of **cumulative human suffering avoided** as a unifying measure, with nine dimensions of measurement and rules for using it responsibly.
- A **century of resilience** with five planning horizons from 2000 to 2100 and beyond, and a three-scenario model for testing strategies.
- A **Polycrisis Resilience Test** of seven questions and a research and action agenda for governments, funders, companies and researchers.

What remains unsettled

Suffering cannot be measured directly, and the weights, time horizons and trade-offs in any measure are partly ethical choices. The causal links between pillars are well supported in some cases, such as health and income, and thinly evidenced in others, such as institutional resilience and long-run survivability. The report's own illustrations are labeled hypothetical and should be read as tools for thinking, not forecasts. Chapter 10 sets out the main criticisms and the evidence that would lead H Heuristics to revise the framework.

PART I · THE IDEA

1. Defining Polycrisis Resilience

IN BRIEF

- Polycrisis Resilience is the effort to minimize human suffering, preserve survivability and improve long-term conditions in a world of connected risks.
- Its central premise is that the goal of resilience is less suffering across generations, not only the ability to withstand crises.
- It is defined by six properties and organized around seven pillars.

1.1 The definition

Polycrisis Resilience

H Heuristics framework, Hunter Hughes, 2026

Polycrisis Resilience is the effort to minimize human suffering, preserve human survivability and improve the long-term conditions of human civilization in an increasingly interconnected world of systemic risks.

In its operational sense it is 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.

The first sentence states the *aim*; the second describes the *capacity* needed to reach it. Both matter, and the order matters too. Capacity is a means. The aim is that fewer people die, fall ill, go hungry, lose their homes or see their prospects shrink.

THE CENTRAL PREMISE

The objective of resilience is not simply to help societies withstand crises. It is to reduce the amount of human suffering that occurs across generations by preventing risks, reducing exposure, expanding adaptive capacity and improving the conditions under which people live.

1.2 Why suffering is the unit of account

Most resilience thinking descends from ecology and engineering. In Holling's (1973) classic formulation, resilience is the ability of a system to absorb disturbance and persist. That idea is powerful, but it has a known limitation when applied to societies: a system can persist while the people inside it suffer. A city can recover its infrastructure while its poorest residents are permanently displaced. A government can survive a food crisis while a generation of children is stunted. A global economy can absorb a pandemic while millions die who could have been saved.

Placing human suffering at the center changes what counts as success in three ways.

- **It asks who bears the harm.** Because suffering falls on particular people, the framework is inherently concerned with distribution. A shock that costs a wealthy economy one percent of output and costs a poor household its food is not the same shock.
- **It counts prevention.** Harm that never happens is invisible in most accounts. A framework built around suffering avoided makes prevention visible, and makes it comparable to response.
- **It reaches across time.** Suffering accumulates. A child who is malnourished, a family that is displaced, a community that loses its livelihood: each carries consequences into the next generation. The framework therefore measures cumulative harm, not only the harm of one year.

This is a value choice, and it is stated openly. Other objectives, such as economic output, national security or ecological integrity, are not rejected. They are treated as instruments that are valuable to the extent that they reduce human suffering and expand human capability. Sen's (1999) view of development as the expansion of the real freedoms people enjoy points in the same direction.

1.3 What the framework is concerned with

The framework takes a long-term, human-centered perspective. Rather than treating economic growth, technological advancement or environmental protection as isolated objectives, it evaluates their contribution to reducing human harm. **Table 3** lists seven concrete aims, each with a leading indicator.

Table 3. Seven aims of Polycrisis Resilience

Aim	Illustrative indicator
Preventing premature mortality and avoidable disease	Preventable deaths; healthy life expectancy
Reducing exposure to air pollution, extreme heat, water insecurity and environmental degradation	Population exposure to PM2.5 and extreme heat; people without safe water
Preventing poverty, hunger, displacement and conflict	People below the poverty line; chronic hunger; forced displacement
Protecting populations in increasingly hazardous environmental conditions	Population in high-hazard areas with adequate protection and warning
Expanding access to healthcare, education, energy and essential infrastructure	Coverage of essential services
Reducing the likelihood that multiple crises reinforce one another	Co-occurrence of hazards on the same populations; fiscal stress after shocks
Preserving the capacity of future generations to live safely and sustainably	Planetary boundary status; catastrophic-risk indicators

Source: H Heuristics.

The framework is concerned with both immediate suffering and cumulative harm over decades, centuries and potentially longer timescales. This is what separates it from emergency relief, which responds to suffering already under way, and from conventional development policy, which often evaluates programs one at a time.

1.4 What counts as suffering

‘Suffering’ is used in this report in a deliberately broad but operational sense: avoidable harm to human life, health, security, dignity and opportunity. **Table 4** shows the main forms and how they are commonly measured. Psychological distress, fear and loss of meaning are real parts of suffering. They are harder to measure at scale and are usually proxied by health, income and displacement data. The report does not claim that the proxies capture everything. Chapter 8 returns to the problem.

Table 4. Forms of human suffering and common proxies

Form	Description	Common proxy
Death	Premature and preventable mortality, including child deaths	Deaths averted; years of life lost
Illness and disability	Disease burden, including from pollution and heat	Disability-adjusted life years
Deprivation	Hunger, thirst, energy poverty, lack of shelter	Food insecurity; water, energy and housing access
Insecurity and violence	Conflict, forced displacement, loss of home	Conflict deaths; displaced people
Lost opportunity	Interrupted education, lost livelihoods, shrunk prospects	Schooling gaps; income loss; poverty entry
Intergenerational harm	Harm that passes to children and later generations	Stunting; inherited debt and degradation

Source: H Heuristics.

1.5 Six defining properties

The framework is defined by six properties that distinguish it from neighboring ideas. **Table 5** states each property and what it asks of a strategy.

Table 5. The six defining properties of Polycrisis Resilience

Property	Meaning	What it asks of a strategy
Multidimensional	Acts on environmental, economic, social and institutional risks together.	Do not optimize one risk while worsening another.
Preventative	Lowers the source of future harm, not only the cost of repair.	Value prevention at least as highly as response.
Developmental	Builds incomes, services and capabilities that reduce vulnerability.	Treat development as a risk-reduction tool.
Intersectional	Values actions that reduce several vulnerabilities at once.	Look for investments that pay off in many ways.
Distributive	Aims for benefits that reach the most exposed populations.	Measure who gains, not only how much.
Long-term	Counts harm across generations and avoids lock-in.	Prefer reversible, adaptable options; weigh future harm seriously.

Source: H Heuristics.

1.6 How it relates to neighboring ideas

Polycrisis Resilience draws on several established bodies of work. **Table 6** shows what it borrows from each and where it differs.

Table 6. Polycrisis Resilience and related concepts

Concept	What it contributes	How Polycrisis Resilience differs
Polycrisis (Morin and Kern, 1999; Tooze, 2022; Lawrence et al., 2024)	Describes crises that are entangled so that their combined effect exceeds the sum of the parts.	Moves from diagnosis to an objective and a program of action.
Resilience (Holling, 1973; Rodin, 2014)	Capacity to absorb shocks, adapt and recover; the resilience dividend.	Defines success by human outcomes, not system persistence.
Sustainable development (UN, 2015)	Integrated goals for people, planet and prosperity.	Adds an explicit risk-interaction lens and a single outcome measure.
Climate adaptation (IPCC, 2022)	Adjusting to actual or expected climate effects.	Treats adaptation as one pillar among seven, linked to development.
Existential risk (Bostrom, 2013; Ord, 2020)	Focuses on risks that could end or permanently diminish humanity.	Includes catastrophic risk as the seventh pillar, but also attends to ordinary, widespread suffering.
Human security (UNDP, 1994)	Centers people's freedom from fear and want.	Adds the long timescale and the interaction of environmental, economic and institutional systems.

Sources as shown. Summaries by H Heuristics.

1.7 What the framework claims, and what it does not

A good framework is specific enough to be wrong. **Table 7** states what Polycrisis Resilience claims and does not claim.

Table 7. Reading the framework

The framework claims that	The framework does not claim that
Reducing human suffering is a useful common objective for development, technology, climate and institutional policy.	Suffering is the only thing that matters, or that other values can be ignored.
Risks interact, so interventions that act on shared causes and shared vulnerabilities are especially valuable.	Every intervention helps every risk in every place.
The seven pillars are complementary and reinforce one another.	The pillars never conflict, or that progress on all of them is easy.
Cumulative suffering avoided can be estimated well enough to guide decisions.	Suffering can be measured exactly, or that models predict the future.
Long timescales matter morally and practically.	Present suffering should be traded away for speculative future gains.

Source: H Heuristics.

PART I · THE IDEA

2. The Interconnected Risk Structure

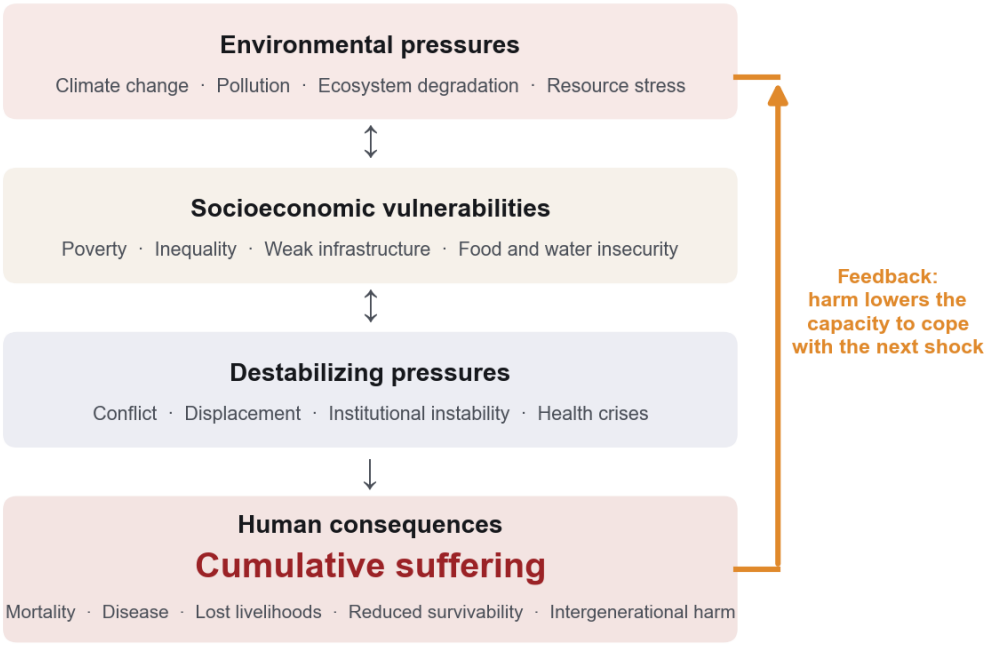
IN BRIEF

- Human suffering increasingly emerges from interacting systems, not from isolated problems.
- Environmental pressures, socioeconomic vulnerabilities and destabilizing pressures reinforce one another and land on the same people.
- Even when individual risks are manageable, their interaction can produce much more severe outcomes. The common denominator is vulnerability.

2.1 Four layers of risk

Figure 1 gives a conceptual picture of the risk structure that Polycrisis Resilience responds to. Environmental pressures interact with socioeconomic vulnerabilities, which interact with destabilizing pressures, and together they produce human consequences that accumulate over time. The arrows run in both directions: a conflict can worsen poverty, and poverty can raise the risk of conflict; environmental stress can drive displacement, and displacement can degrade the environment.

Figure 1. The interconnected risk structure



Source: H Heuristics (conceptual representation; feedback loops can operate in both directions, intensifying or prolonging vulnerabilities).

A central concern is that populations may become increasingly exposed to overlapping environmental and socioeconomic pressures. Even when individual risks are manageable, their interaction can produce much more severe outcomes. Polycrisis Resilience therefore emphasizes reducing the underlying vulnerabilities that allow crises to compound.

2.2 How crises become entangled

Researchers describe three ways in which crises become entangled (Lawrence et al., 2024; Janzwood and Homer-Dixon, 2022). **Table 8** summarizes them.

Table 8. Three patterns of crisis entanglement

Pattern	Description	Example
Common driver	One underlying cause produces several stresses at once.	Fossil fuel combustion drives climate change, air pollution and fuel-import dependence.
Cascade	Failure in one system triggers failure in the next.	A fuel price spike raises fertilizer and transport costs, then food prices, then public debt, then cuts to health and education.
Compounding	Several stresses fall on the same people or places at the same time.	A heatwave hits a household that already cooks over smoky fuel, lacks a clinic and has lost income.

Source: H Heuristics, building on Lawrence et al. (2024).

All three patterns are visible in recent data. The World Economic Forum's *Global Risks Report 2026* ranks geoeconomic confrontation and state-based armed conflict as the leading risks over a two-year horizon and extreme weather as the leading risk over ten years, with several environmental risks in the top ten (WEF, 2026). Disaster losses illustrate how large the gap is between visible and total harm. The United Nations Office for Disaster Risk Reduction estimates direct disaster losses at about $202 billion a year but total costs, once cascading and ecosystem effects are counted, at about $2.3 trillion a year (UNDRR, 2025). **Figure 5** in Chapter 5 shows these numbers beside the adaptation finance gap.

2.3 The pressures today

Table 9 collects recent indicators for the main pressure groups. The figures are not a complete inventory. They show that every layer of the structure is under strain at the same time.

Table 9. Indicators of pressure across the risk structure

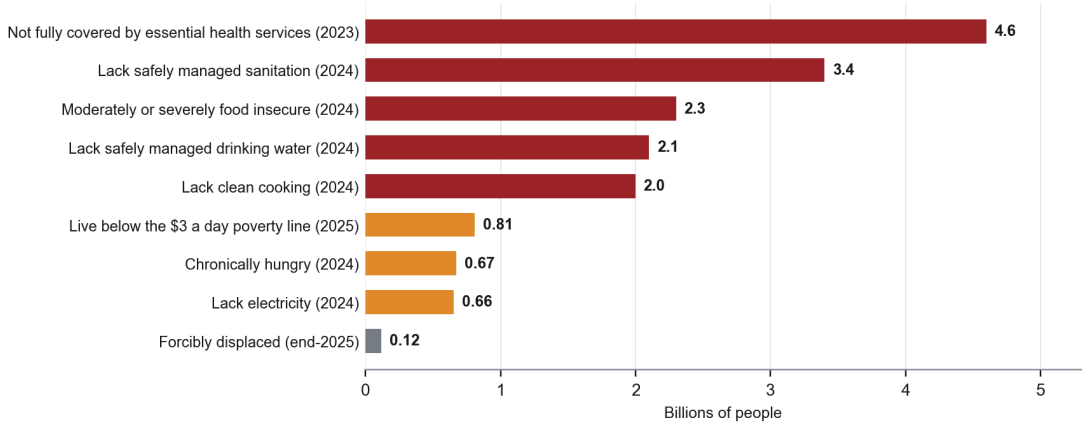
Layer	Indicator	Source
Environmental	2025 was about 1.43 °C above the 1850–1900 baseline. Seven of nine planetary boundaries are assessed as transgressed.	WMO, 2026; Steinert et al., 2025
Environmental	Air pollution was linked to about 7.9 million deaths in 2023, including about 4.9 million from outdoor fine particles and 2.8 million from household air pollution.	HEI, 2025
Environmental	Heat-related deaths averaged about 546,000 a year in 2012–2021, and the heat-mortality rate had risen about 23% since the 1990s.	Lancet Countdown, 2025
Socioeconomic	About 810 million people live below the $3 a day poverty line; about 2.3 billion are moderately or severely food insecure.	World Bank, 2025; FAO et al., 2025
Socioeconomic	About 3.4 billion people live in countries that spend more on interest than on health or education.	UNCTAD, 2025
Destabilizing	UCDP recorded a record 65 state-based armed conflicts in 2025, with about 245,000 conflict deaths, the highest in over three decades.	Uppsala Conflict Data Program, 2026
Destabilizing	About 118 million people were forcibly displaced at the end of 2025, the first fall in a decade after a rise to 123 million.	UNHCR, 2026
Human consequences	About 4.8 million children died before their fifth birthday in 2023; fragile and conflict-affected countries hold a quarter of births but nearly half of those deaths.	UN IGME, 2025

Sources as shown; figures are rounded and some are preliminary.

2.4 The scale of present deprivation

Much of the suffering that Polycrisis Resilience aims to reduce is not a future possibility. It is present, large and concentrated. **Figure 2** puts nine measures on one axis. The largest groups are people who lack essential health services, sanitation, adequate food and safe water: basic needs for which the technology and knowledge exist.

Figure 2. The scale of present deprivation (billions of people)



Sources: WHO and World Bank (2025); WHO and UNICEF JMP (2025); FAO et al. (2025); SEforALL et al. (2026); World Bank (2025); UNHCR (2026). Categories overlap; figures cannot be added together.

These measures overlap heavily, so they cannot be summed into a number of ‘people in distress’. What they show together is that the same populations tend to appear in many of them. This matters for resilience, because the same households that lack clean cooking and safe water are the households with the least capacity to cope with a heatwave, a flood or a price spike.

2.5 Vulnerability is the common denominator

Hazards such as heat, floods, droughts, pollution or conflict become suffering when they meet vulnerability: the lack of resources, services, information and institutions that allows people to avoid, absorb or recover from harm. The IPCC's Sixth Assessment Report estimates that between 3.3 and 3.6 billion people live in contexts that are highly vulnerable to climate change, and finds that vulnerability is strongly shaped by poverty, governance, inequality and development patterns (IPCC, 2022). Hallegatte et al. (2016) estimated that climate change could push more than 100 million additional people into poverty by 2030, with the outcome depending heavily on how inclusive and fast development is.

The same hazard produces very different outcomes in different places. High-income countries with strong early warning, reliable power, universal health services and good building standards experience a flood or heatwave very differently from low-income countries without them. This is the empirical basis for the framework's emphasis on *reducing the underlying vulnerabilities that allow crises to compound*, and for its inclusion of economic convergence among the pillars.

Why the framework looks at vulnerability, not only hazard

Hazards are partly beyond human control, and climate-related hazards are already locked in to a degree. Vulnerability is something societies can change. Where the same hazard kills hundreds in one country and no one in another, the difference is mostly vulnerability.

Reducing vulnerability also works against several hazards at once. A clinic with reliable power helps in a heatwave, a flood, a pandemic and a conflict.

PART II · THE PILLARS

3. The Seven Pillars

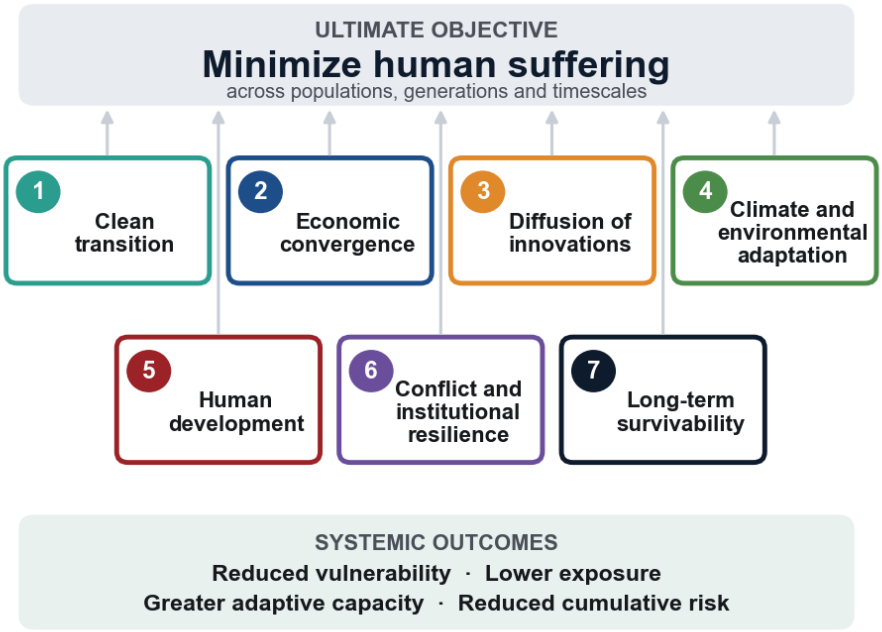
IN BRIEF

- The framework organizes interventions around seven complementary pillars.
- Each pillar reduces suffering through one or more of four mechanisms: preventing risks, reducing exposure, expanding adaptive capacity and improving living conditions.
- No pillar is sufficient alone; the value of the framework is in the combination.

3.1 The framework at a glance

Figure 3 shows the structure. The ultimate objective sits at the top: to minimize human suffering across populations, generations and timescales. The seven pillars act on it, and they produce four kinds of systemic outcome: reduced vulnerability, lower exposure, greater adaptive capacity and reduced cumulative risk.

Figure 3. The Polycrisis Resilience framework



Source: H Heuristics (conceptual framework).

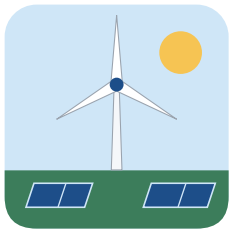
The framework's distinctive proposition is that development, technological progress and environmental sustainability are components of a larger human survivability strategy, and it offers a common language for tracing how an intervention in one domain benefits others.

3.2 Four mechanisms

The pillars work through four mechanisms. Every pillar uses at least two, and the strongest investments use three or four at once.

- **Prevent risks:** remove or reduce the source of harm before it occurs (clean transition, conflict prevention, long-term survivability).
- **Reduce exposure:** keep fewer people in harm's way, or shield them when hazards occur (adaptation, clean transition, convergence).
- **Expand adaptive capacity:** provide the resources, skills, finance and institutions to cope, adjust and recover (convergence, diffusion, institutional resilience).
- **Improve living conditions:** raise the baseline of health, nutrition, education, energy and housing so that shocks do less damage (human development, convergence, diffusion).

3.3 The seven pillars



PILLAR 1

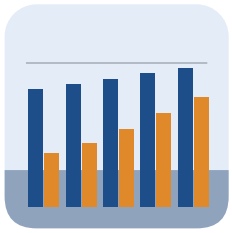
Clean transition

Accelerating the transition toward cleaner energy, transportation, industrial production and household technologies to reduce pollution, climate risks and environmental health burdens.

How it reduces suffering: *Removes shared sources of harm, since one change in how energy is made lowers climate, pollution and fuel-price risks together.*

Evidence: Renewables overtook coal in global electricity generation in 2025 (33.8% against 33.0%), and clean energy now attracts about $2.2 trillion of investment against about $1.2 trillion for fossil fuels (Ember, 2026; IEA, 2026).

Main limit: Benefits depend on how the transition is carried out; Chapter 5 returns to this.



PILLAR 2

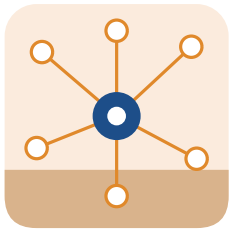
Economic convergence

Reducing disparities in living standards, productive capacity, infrastructure and access to essential services between developed and developing economies.

How it reduces suffering: *Reduces the structural vulnerability that lets crises compound, and builds the income and fiscal capacity to adapt.*

Evidence: Only 34 of 108 middle-income economies reached high income between 1990 and 2023 (World Bank, 2024), so convergence is neither automatic nor guaranteed.

Main limit: Convergence that reproduces pollution-intensive infrastructure can create new vulnerabilities.



PILLAR 3

Diffusion of innovations

Accelerating the adoption of technologies, practices and innovations that reduce human vulnerability, particularly in underserved populations.

How it reduces suffering: *Shortens the time between a solution existing and a solution reaching the people who need it.*

Evidence: Mobile money in Kenya raised the incomes of about 2% of households above the poverty line, and the effect was strongest for women-headed households (Suri and Jack, 2016).

Main limit: Diffusion follows existing inequality unless it is deliberately designed otherwise.



PILLAR 4

Climate and environmental adaptation

Strengthening the capacity of communities to withstand heat, flooding, drought, pollution, ecosystem disruption and changing environmental conditions.

How it reduces suffering: *Reduces exposure and sensitivity to hazards that cannot now be prevented.*

Evidence: Developing countries may need $310 to $365 billion a year for adaptation by 2035, against about $26 billion of international public finance in 2023 (UNEP, 2025).

Main limit: Adaptation has limits, and poorly designed adaptation can shift risk to others.



PILLAR 5

Human development

Expanding healthcare, education, nutrition, sanitation, clean cooking and other fundamental determinants of human well-being.

How it reduces suffering: *Directly improves living conditions and strengthens the people who must adapt.*

Evidence: About 4.6 billion people are not fully covered by essential health services, and about 2.1 billion lack safely managed drinking water (WHO and World Bank, 2025; WHO and UNICEF, 2025).

Main limit: Needs sustained public finance and delivery capacity, both scarce where needs are greatest.



PILLAR 6

Conflict prevention and institutional resilience

Reducing conflict risks, strengthening governance, improving disaster preparedness and maintaining essential services during periods of instability.

How it reduces suffering: *Keeps the other pillars functioning under stress and prevents the most severe forms of suffering.*

Evidence: 2025 saw a record 65 state-based conflicts and about 245,000 conflict deaths (UCDP, 2026).

Main limit: Institutions are slow to build and hard to measure; prevention is under-funded compared with response.



PILLAR 7

Long-term survivability

Identifying emerging threats, reducing catastrophic risks, protecting critical systems and preserving the conditions necessary for human civilization to endure.

How it reduces suffering: *Protects against the outcomes that would end or permanently diminish the future, which carry the largest cumulative suffering.*

Evidence: Seven of nine planetary boundaries are assessed as transgressed (Steinert et al., 2025), and one researcher's informal estimate of the chance of an existential catastrophe this century is about one in six (Ord, 2020; a subjective judgment).

Main limit: Probabilities are deeply uncertain, and attention can be diverted from present suffering.

PART II · THE PILLARS

4. Economic Convergence as Polycrisis Mitigation

IN BRIEF

- One of the framework's most important contributions is positioning economic convergence as a form of polycrisis mitigation.
- Development reduces the structural conditions that make populations disproportionately vulnerable to interconnected crises.
- The proposed chain is economic convergence, reduced vulnerability, greater adaptive capacity and reduced suffering, provided that convergence is itself sustainable.

4.1 The idea

Development economics is not merely concerned with increasing incomes or closing productivity gaps. It can also reduce the structural conditions that make populations disproportionately vulnerable to interconnected crises. The poorest households are the most exposed to heat, flood, price shocks and disease, and are the least able to recover. The countries with the weakest infrastructure and the highest cost of borrowing are the least able to protect their people and the slowest to rebuild.

This is an old observation in the disaster literature. Kahn (2005) found that richer countries and countries with better institutions suffer far fewer deaths from natural hazards, after controlling for the hazards themselves. The United Nations' 2025 global assessment of disaster risk, titled *Resilience Pays*, argues that investing in prevention and resilience repays itself in avoided losses (UNDRR, 2025). The framework draws a broader conclusion: if vulnerability is the common denominator of suffering, then reducing the economic gap between richer and poorer societies is among the most powerful ways to reduce suffering from *any* hazard.

4.2 How development interventions reduce vulnerability

Table 10 gives eight examples of development interventions and the resilience benefit each can deliver. The list is illustrative, not exhaustive.

Table 10. Development interventions and their potential resilience benefits

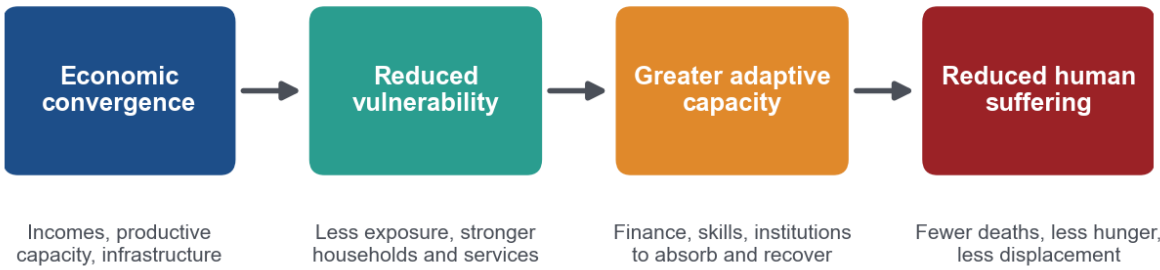
Development intervention	Potential resilience benefit
Clean electricity	Reduced pollution and energy insecurity
Clean cooking	Reduced household air pollution
Healthcare expansion	Reduced disease and mortality
Digital infrastructure	Improved access to information and services
Agricultural technology	Greater food-system resilience
Education	Increased adaptive capacity
Urban infrastructure	Reduced exposure to environmental hazards
Industrial development	Greater economic capacity to finance adaptation

Source: H Heuristics.

4.3 The causal chain

Figure 4 states the proposition as a chain. Each link is individually supported by research; the whole chain is the framework's claim.

Figure 4. Economic convergence to reduced suffering



Source: H Heuristics (conceptual; grade C). Each link can be weakened by poor design or reversed by shocks.

- **Convergence to reduced vulnerability.** Higher and more stable incomes, better housing, working infrastructure and wider service access reduce how much any given hazard harms a household or community.
- **Reduced vulnerability to greater adaptive capacity.** Less vulnerable societies free up resources and attention, and have the skills, savings and institutions to invest in adaptation and recovery. Public budgets are one channel: the UN estimates that 3.4 billion people live in countries that spend more on interest than on health or education (UNCTAD, 2025).
- **Adaptive capacity to reduced suffering.** Adaptive capacity turns hazards that would have been disasters into manageable events, and turns manageable events into non-events.

4.4 Why convergence is hard

If the benefits of convergence are so large, why has it been slow? The evidence points to several persistent barriers.

Table 11. Barriers to convergence and the levers that address them

Barrier	Evidence	Lever
The middle-income trap	Of 108 middle-income economies in 2023, only 34 had reached high income since 1990, and many of those had special advantages such as EU integration or oil (World Bank, 2024).	Investment, technology infusion and then innovation in successive stages; open trade and competition.
High cost of capital	Financing for clean projects costs more than twice as much in emerging and developing economies as in advanced economies (IEA, 2024).	Concessional and blended finance; guarantees; stronger domestic markets; currency risk instruments.
Debt burdens	3.4 billion people live in countries that spend more on interest than on health or education (UNCTAD, 2025).	Debt restructuring and relief; debt-for-resilience swaps; better debt transparency.
Weak infrastructure	About 655 million people lack electricity and about 2 billion lack clean cooking (SEforALL et al., 2026).	Distributed solar and storage; public–private investment; local manufacturing.

Barrier	Evidence	Lever
Technology lag	Adoption of new technologies is often delayed by decades between rich and poor countries (Comin and Hobijn, 2010).	Diffusion policy (Pillar 3); skills; digital public infrastructure.
Fragility and conflict	More than half of the world's extreme poor are projected to live in fragile and conflict-affected settings by 2030 (World Bank, 2025).	Conflict prevention and institution building (Pillar 6).

Sources as shown.

4.5 Convergence must be sustainable

The framework attaches a condition. Development that reproduces pollution-intensive infrastructure or increases environmental exposure can create new vulnerabilities even while improving incomes. A country that builds its power grid on coal may raise incomes and also raise air pollution deaths, climate risk and exposure to fuel markets. A city that expands onto a floodplain may raise output and also raise flood risk.

Convergence that avoids the pollution trap

The opportunity is that later developers can skip some of the dirtier stages that earlier developers passed through, a point made in the economic history literature as the advantage of backwardness (Gerschenkron, 1962). Clean electricity, distributed solar, electric mobility, mobile and digital services, and climate-resilient buildings can all be adopted at a lower cost than they once were.

This is why the first pillar (clean transition), the second (convergence) and the third (diffusion of innovations) are treated as one linked strategy. Convergence provides the demand and the reason; clean technology provides the path; diffusion shortens the journey.

4.6 What the evidence does and does not show

The link from higher income to lower vulnerability is among the best-established in development and disaster research (grade B). The claim that *closing the gap between countries*, specifically, reduces vulnerability to interconnected crises is plausible and consistent with the evidence but less directly tested (grade C). Growth alone does not guarantee lower vulnerability. Inequality within countries, weak governance and environmental damage can leave large populations exposed even as average incomes rise. For that reason convergence is treated as one pillar among seven and is judged by its effect on suffering, not by income statistics alone.

PART II · THE PILLARS

5. Clean Transition, Diffusion and Adaptation

IN BRIEF

- Three pillars act mainly on hazards and exposure: the clean transition cuts risks at source, diffusion spreads solutions, and adaptation reduces harm that cannot be avoided.
- Clean technology is cheap and spreading, but gaps in finance and access leave the poorest countries behind.
- Adaptation finance is a small fraction of estimated needs, even though adaptation and resilience pay for themselves.

5.1 Clean transition: removing shared sources of harm

The clean transition is the shift away from pollution-intensive, environmentally damaging and inefficient systems toward cleaner energy, transportation, industry, agriculture and household technologies. Its place in the framework follows from the common-driver pattern described in Chapter 2: burning fossil fuels and biomass is a shared source of climate change, outdoor and indoor air pollution, and fuel-import dependence, so replacing it reduces several risks together.

The evidence of momentum is strong. Renewables overtook coal in global electricity generation in 2025. Solar electricity cost about $44 per megawatt-hour in 2025, about 89% below 2010 levels. Electric cars were about a quarter of new car sales. The IEA projects clean energy investment at about $2.2 trillion in 2026, against about $1.2 trillion for fossil fuels (Ember, 2026; IRENA, 2026; IEA, 2026). The gaps are equally clear: about 655 million people lack electricity, about 2 billion lack clean cooking and Africa receives only about 2% of clean energy investment (SEforALL et al., 2026; IEA, 2026).

The clean transition is covered in depth in a companion report in this series, *Polycrisis Resilience: Clean Transition*. Three points matter here. Benefits are not automatic: a coal-powered electric vehicle fleet still pollutes. The largest human benefit may be health, since cleaner air and cooking could prevent a large share of the 7.9 million deaths a year linked to air pollution. And the transition is a development strategy, because clean technologies are now often the cheapest way to add new energy.

5.2 Diffusion of innovations: closing the gap between invention and impact

Many of the tools that reduce suffering already exist: vaccines, oral rehydration therapy, drought-tolerant seeds, solar lighting, mobile banking, early-warning systems, water treatment. The binding constraint is often not invention but adoption. Rogers (1962) described how innovations spread through populations at different speeds, shaped by cost, trust, networks and complementary infrastructure. Comin and Hobijn (2010) found that technology adoption lags between countries have been shrinking over time but remain long for many technologies, and that these lags account for a substantial share of cross-country income differences.

Diffusion matters for resilience in three ways. It brings proven solutions to those who need them sooner. It enables leapfrogging: skipping an older technology entirely, as mobile phones skipped fixed lines. And it builds local capability, because adoption is accompanied by skills, businesses and maintenance networks. The best-known example is mobile money. In Kenya, access to the M-Pesa system raised consumption and moved about 2% of households out of extreme poverty, with larger effects for women-headed households (Suri and Jack, 2016).

Diffusion works best where four conditions are met: affordable finance (pay-as-you-go models, microfinance, concessional loans), complementary infrastructure (phones need networks, appliances need power), local fit and trust, and public enablers such as standards, procurement and open digital public infrastructure.

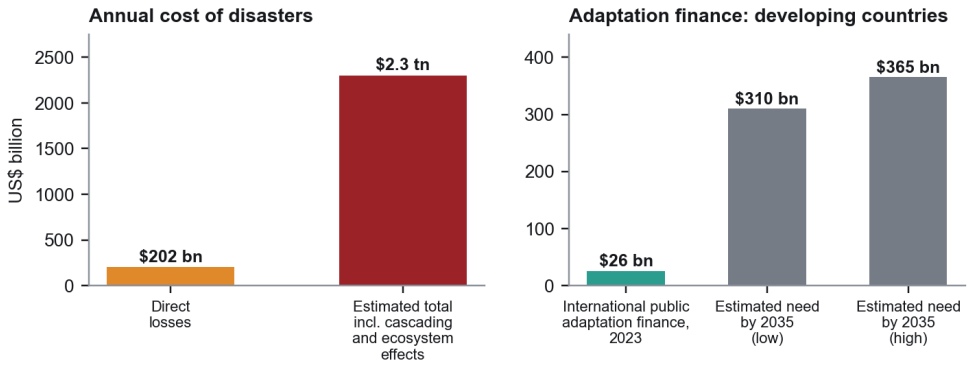
Diffusion also has a shadow. Without deliberate design, new technologies tend to reach the richer, urban and better-connected first, and can widen gaps in the short run. The framework therefore treats the *distributive* property as a design requirement for diffusion programs, not a hope.

5.3 Climate and environmental adaptation: reducing harm that cannot be prevented

Even with rapid mitigation, the climate has warmed by about 1.43 °C above pre-industrial levels (WMO, 2026), and a degree of further change is already locked in. Adaptation is the process of adjusting to actual or expected climate and environmental conditions, and moderating the harm. It includes early warning systems, heat action plans, flood defenses and nature-based protection, drought-tolerant crops, water storage and efficiency, resilient housing and infrastructure, and the protection of ecosystems that buffer hazards.

The economic case is strong. The Global Commission on Adaptation (2019) estimated that investing $1.8 trillion globally between 2020 and 2030 in five areas, including early warning systems and resilient infrastructure, could generate $7.1 trillion in net benefits, and that 24 hours' warning of an impending storm or heatwave can cut the damage by around 30%. UNDRR (2025) finds that disaster losses are an order of magnitude larger than recorded direct costs once cascading effects are counted. **Figure 5** sets that figure beside the adaptation finance gap.

Figure 5. The cost of disasters and the adaptation finance gap



Sources: UNDRR (2025) for disaster costs; UNEP (2025) for adaptation finance. The $2.3 trillion estimate includes cascading and ecosystem effects and is an estimate, not an observed loss.

UNEP's *Adaptation Gap Report 2025* estimates that developing countries will need between $310 and $365 billion a year for adaptation by 2035, about 12 to 14 times current international public flows of about $26 billion in 2023 (UNEP, 2025). Much of the finance that does flow comes as debt, which can add to the burdens that make countries vulnerable in the first place.

Adaptation and the other pillars

Adaptation is where the pillars meet most visibly. A heat action plan needs reliable power (clean transition), health systems (human development), data and early-warning technology (diffusion), local government that can act (institutional resilience) and money (convergence). This is why the framework treats adaptation as a pillar to be built alongside the others and not as a separate climate silo.

Adaptation also has limits. Some impacts exceed what any adaptation can absorb, such as the loss of low-lying island territory or the end of some crops in some places, and some adaptation measures shift risk to others (maladaptation).

PART II · THE PILLARS

6. Human Development, Institutions and Survivability

IN BRIEF

- Three pillars act mainly on living conditions, stability and the long run: human development, conflict prevention and institutional resilience, and long-term survivability.
- Health, nutrition, water and education are both ends in themselves and the base on which other resilience rests.
- Institutions decide whether the other pillars function under stress, and survivability asks whether the long future remains open.

6.1 Human development: the foundation

Human development covers healthcare, education, nutrition, sanitation, clean cooking and other fundamental determinants of well-being. It is the pillar where suffering is most directly reduced, and, in the qualitative assessment in Chapter 7, the pillar most strengthened by the others.

The unmet need is large. About 4.6 billion people are not fully covered by essential health services, and about 2.1 billion face financial hardship from health costs (WHO and World Bank, 2025). About 2.1 billion people lack safely managed drinking water and 3.4 billion lack safely managed sanitation (WHO and UNICEF, 2025). The 2025 State of Food Security and Nutrition report estimates that about 673 million people were chronically hungry in 2024 and about 2.3 billion were moderately or severely food insecure (FAO et al., 2025). UNESCO counts roughly 270 million children and youth out of school (UNESCO, 2025). In 2023, about 4.8 million children died before age five, many from causes that are preventable and treatable (UN IGME, 2025).

Human development matters for resilience for reasons beyond its direct benefits. A healthy, educated, adequately nourished population withstands shocks better and recovers faster. Women's education, for example, is consistently linked to lower child mortality and stronger household adaptation. Reliable water, sanitation and cooking fuel reduce the baseline burden of disease, so a heatwave or a flood has less to work on. And skilled people are the substrate for every other pillar: adaptation planners, nurses, engineers, regulators and farmers who can use new technology.

6.2 Conflict prevention and institutional resilience

Conflict is the most destructive of the destabilizing pressures. It kills directly, displaces, destroys infrastructure and health systems, and drives hunger. The UN IGME (2025) reports that fragile and conflict-affected countries account for about a quarter of live births but nearly half of under-five deaths. UCDP recorded a record 65 state-based conflicts in 2025, with about 245,000 deaths (UCDP, 2026), and UNHCR counted about 118 million forcibly displaced people at the end of 2025, a first decline in a decade but still very high (UNHCR, 2026). The World Bank projects that more than half of the world's extreme poor will live in fragile and conflict-affected settings by 2030 (World Bank, 2025).

This pillar has two parts. **Conflict prevention** addresses the causes of violence: exclusion, grievance, competition over scarce resources and weak governance. The joint United Nations and World Bank study *Pathways for Peace* concluded that prevention is cost-effective, estimating that it could save up to $70 billion a year in avoided costs (UN and World Bank, 2018). **Institutional resilience** is the ability of governments, public

services and communities to keep essential functions going under stress: to warn, to coordinate, to deliver water, power and health care during a crisis, and to maintain the rule of law.

Institutions are the pillar that makes the others work. A national early-warning system is of no use without trained local officials who can act on it. A clean energy investment fails without a regulator who can enforce contracts. Resilient institutions are transparent enough to be trusted, flexible enough to learn, and financed enough to function.

Climate, resources and conflict

Research does not show that climate change automatically causes conflict, and the framework does not claim a simple causal chain. But environmental stress such as drought, food-price spikes and displacement can interact with weak governance, inequality and old grievances to raise risks. This is the type of compounding the framework exists to address.

6.3 Long-term survivability

The seventh pillar concerns the outcomes that would be the most severe of all: those that would end or permanently diminish human civilization. It includes identifying emerging threats, reducing catastrophic risks, protecting critical systems and preserving the conditions necessary for human civilization to endure.

The case for treating survivability as a pillar is that the number of people who could suffer, across all future generations, is vast. Bostrom (2013) and Ord (2020) argue that reducing existential risk is of exceptional importance for this reason. Ord (2020) offers an informal estimate of about one in six that humanity suffers an existential catastrophe this century, with much of the risk coming from human activity such as engineered pandemics, nuclear war and misaligned artificial intelligence. Such estimates are subjective and contested. The framework takes no position on their exact size. It makes a narrower claim: that the possibility of catastrophic outcomes, however it is estimated, is enough to justify deliberate attention to monitoring, resilience of critical systems and international coordination.

Table 12. Domains of long-term survivability

Domain	Examples	Resilience measures
Planetary systems	Seven of nine planetary boundaries transgressed; possible tipping points	Protect boundaries; early detection of tipping dynamics; adaptation.
Biological risks	Natural and engineered pandemics	Surveillance, rapid response, laboratory biosafety, health system capacity.
Technological risks	Advanced AI, cyber failures, nuclear weapons	Safety research, governance, verification, arms control, resilient infrastructure.
Critical systems	Power grids, food and water systems, communications, supply chains	Redundancy, decentralization, stockpiles, protection from cascading failure.
Monitoring and foresight	Satellite and sensor networks, risk models, scenario analysis	Open data, shared warning, anticipatory financing.

Source: H Heuristics, drawing on Steinert et al. (2025) and Ord (2020).

Survivability without neglecting the present

A common criticism of long-term thinking is that it can divert attention and resources from suffering that is happening now. The framework answers by pairing the pillars. Many survivability measures, such as stronger health systems and more resilient grids, also reduce present suffering. The seventh pillar is meant to complement the other six, not to compete with them.

PART II · THE PILLARS

7. How the Pillars Work Together

IN BRIEF

- The pillars are complementary: progress in one tends to strengthen others.
- Economic convergence is the pillar that most strengthens the rest; human development is the one most strengthened by them.
- The same links can run in reverse as vicious loops, and the pillars also create trade-offs that must be managed.

7.1 Interactions between pillars

Figure 6 gives a qualitative assessment of how strongly each pillar strengthens each of the others. The scores are judgments by the author based on the literature (grade C); they are meant to prompt discussion, not to be taken as measurements. The pattern is informative. **Economic convergence** has the highest total influence on other pillars (score 14 of a possible 18), followed by diffusion of innovations (13) and clean transition (12). **Human development** is the pillar that is most strengthened by the others (score 14), followed by economic convergence (13) and climate adaptation (12). Long-term survivability has the lowest influence on the other pillars (score 7), because it is mostly an outcome pillar.

Figure 6. How strongly each pillar strengthens the others: a qualitative assessment

Pillar that acts \ Pillar that is strengthened	Clean transition	Economic convergence	Diffusion of innovations	Climate adaptation	Human development	Conflict and institutions	Long-term survivability
Clean transition	·	Strong	Strong	Strong	**Very strong**	Modest	Strong
Economic convergence	Strong	·	Strong	**Very strong**	**Very strong**	Strong	Strong
Diffusion of innovations	**Very strong**	**Very strong**	·	Strong	Strong	Modest	Strong
Climate adaptation	Modest	Strong	Modest	·	**Very strong**	Strong	Strong
Human development	Modest	**Very strong**	Strong	Strong	·	Strong	Modest
Conflict and institutions	Modest	Strong	Modest	Strong	Strong	·	**Very strong**
Long-term survivability	Modest	Modest	Modest	Modest	Modest	Strong	·

Source: H Heuristics qualitative scores (illustrative, grade C). Read rows as the pillar that acts and columns as the pillar that is strengthened.

Four pairings stand out as particularly strong.

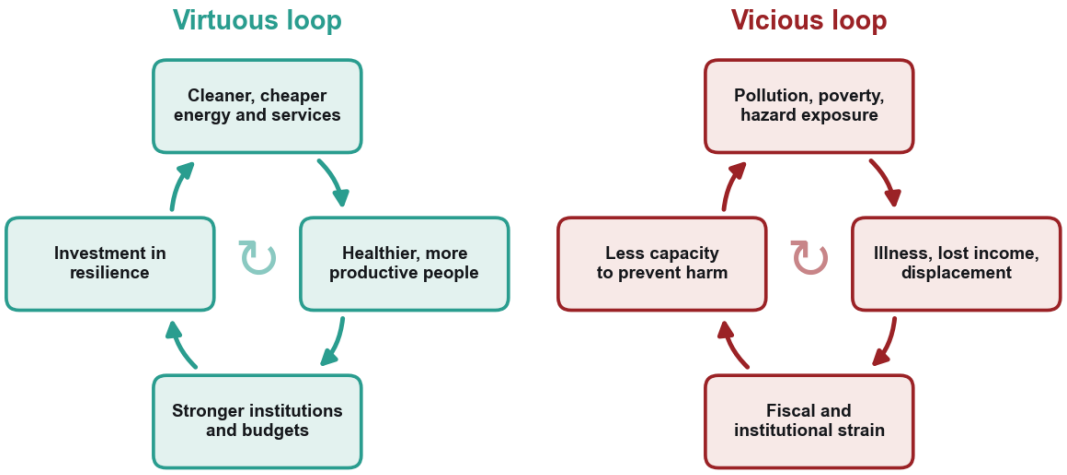
- **Clean transition and human development.** Cleaner air, cleaner cooking and reliable electricity directly improve health, education and productivity.
- **Economic convergence and adaptation.** Higher incomes and lower borrowing costs finance adaptation, and adaptation protects the incomes that convergence builds.

- **Diffusion of innovations and economic convergence.** Faster adoption of proven technology is among the main drivers of catching up.
- **Institutions and survivability.** Capable, trusted institutions are the main defense against catastrophic risk.

7.2 Reinforcing loops

Interactions of this kind create loops. **Figure 7** contrasts a **virtuous loop** with a **vicious loop**. In the virtuous loop, cleaner and cheaper energy and services improve health and productivity, which strengthens institutions and budgets, which fund more investment in resilience. In the vicious loop, pollution, poverty and hazard exposure cause illness, lost income and displacement, which strain public finances and institutions and leave less capacity to prevent the next round of harm.

Figure 7. Virtuous and vicious loops



Source: H Heuristics (conceptual; grade C). Both loops can operate at the same time in different parts of the same country.

The existence of vicious loops is the main reason to act early and together. Once a country, region or community is in a vicious loop, each additional shock is more damaging and the room to respond narrows. The Disaster Risk Reduction community has long observed that poor countries can be caught in a cycle of loss and partial recovery that prevents them from closing the gap. Virtuous loops are not automatic either. They need to be started and protected, and each link can fail.

7.3 Tensions and trade-offs

Seven pillars cannot all be advanced at once without friction. **Table 13** lists the main tensions and how a framework focused on suffering would approach them.

Table 13. Tensions between pillars and how to manage them

Tension	Why it arises	How to manage it
Convergence and emissions	Faster growth in lower-income countries can raise energy use and emissions if it relies on fossil fuels.	Support clean-technology leapfrogging and finance; judge convergence by sustainable measures.
Clean transition and local harm	Mining of critical minerals, large solar and hydropower projects, and the loss of fossil jobs create local costs.	Strong environmental and social safeguards; just-transition support; recycling and diversified supply.

Tension	Why it arises	How to manage it
Diffusion and inequality	New technologies often reach richer groups first.	Design for access; subsidize early adoption by the poorest; public digital infrastructure.
Adaptation and moral hazard	Protection can encourage settlement in hazardous places, or shift risk to neighbors.	Land-use planning; integrated risk assessment; avoid maladaptation.
Human development and fiscal limits	Universal services need sustained public finance that many countries lack.	Domestic resource mobilization; debt relief; concessional finance; efficiency.
Security and liberty	Stronger monitoring, emergency powers and surveillance can reduce some risks and create others.	Rule of law; sunset clauses; independent oversight; transparency.
Present and future	Spending on long-term risk can compete with present needs.	Prefer measures with present benefits; keep both horizons in the metric.

Source: H Heuristics.

The existence of tensions is not an argument against the framework. It is an argument for evaluating interventions by their net effect on suffering, which is the reason the framework proposes a common measure (Chapter 8).

7.4 Portfolio logic: where to start

No country or organization can fund every pillar at once, and the right starting point differs by context. Three rules of thumb follow from the framework.

- **Start with the binding constraint.** In a place without electricity or clean water, those come first. Where capital is scarce, reducing the cost of capital may unlock more than a dozen separate projects.
- **Favor multi-pillar investments.** Solar power for a rural clinic simultaneously acts on clean transition, human development, adaptation and institutional resilience.
- **Build in redundancy and optionality.** Under deep uncertainty, prefer options that work across many possible futures and can be adjusted as conditions change.

PART III · MEASUREMENT AND TIME

8. Measuring Human Suffering Avoided

IN BRIEF

- Resilience should be evaluated by its human consequences, not by the number of projects implemented or technologies deployed.
- Nine dimensions of measurement cover mortality, health, environment, climate, development, food and water, conflict, adaptation and long-term security.
- A useful overarching concept is cumulative human suffering avoided, estimated with explicit rules for counterfactuals, distribution, uncertainty and overlap.

8.1 Why measure outcomes

A particularly important distinction is that resilience should ultimately be evaluated by its human consequences, not simply by the number of projects implemented or technologies deployed. Programs are usually reported in terms of what was built: megawatts installed, clinics opened, kilometers of road, dollars disbursed. These are necessary to know but do not say whether people are better off. Table 14 shows the difference with an example.

Table 14. From inputs to suffering avoided: a rural solar-plus-storage program

Level	Example measure	What it tells you
Inputs	Dollars invested; panels and batteries procured	How much was spent
Outputs	Megawatts installed; clinics and schools connected	What was built
Outcomes	Hours of reliable power; vaccines stored; students studying at night; smoke exposure reduced	What changed in people's conditions
Impacts	Deaths and illnesses avoided; income gains; resilience during a heatwave or flood	What suffering was avoided
Cumulative impact	Avoided harm summed across people and years, adjusted for overlap and risk shifting	The full human consequence

Source: H Heuristics.

8.2 Nine dimensions of measurement

Table 15 lists nine dimensions of measurement. Each has established data sources, which is a deliberate choice: the framework builds on measures that countries and international bodies already collect.

Table 15. Dimensions of resilience measurement

Dimension	Measurement	Example data source
Mortality	Preventable deaths avoided	Global Burden of Disease; UN IGME; national vital registration
Public health	Disease burden and healthy life expectancy	WHO; Global Burden of Disease
Environment	Population exposure to harmful pollution	HEI State of Global Air; WHO exposure data
Climate	Population exposure to extreme heat and disasters	Lancet Countdown; EM-DAT; UNDRR

Dimension	Measurement	Example data source
Development	Poverty reduction and access to essential services	World Bank; SDG databases; Tracking SDG 7
Food and water	Food insecurity and safe water access	FAO SOFI; WHO and UNICEF JMP
Conflict	Conflict-related mortality and displacement	UCDP; UNHCR; ACLED
Adaptation	Capacity to withstand and recover from shocks	Recovery time; coverage of early warning; insurance and social protection
Long-term security	Reduction in catastrophic and existential risks	Planetary boundary indicators; expert risk assessments

Source: H Heuristics.

8.3 Cumulative human suffering avoided

Cumulative human suffering avoided

H Heuristics analytical concept (proposed)

Cumulative human suffering avoided is the total reduction in avoidable harm to human life, health, security and opportunity, summed across all affected people and all affected years, that can be credibly attributed to an intervention or a set of interventions, compared with a counterfactual in which they were not made.

In schematic form: the sum, over groups and years, of the difference between baseline harm and harm with the intervention, weighted by distribution and time, with overlaps removed and shifted risks subtracted.

A useful overarching analytical concept would be cumulative human suffering avoided. This requires evaluating both direct and indirect effects, accounting for distribution across populations, uncertainty, time horizons, and the possibility that interventions shift risks elsewhere. **Table 16** turns each requirement into a working rule.

Table 16. Seven accounting rules for cumulative suffering avoided

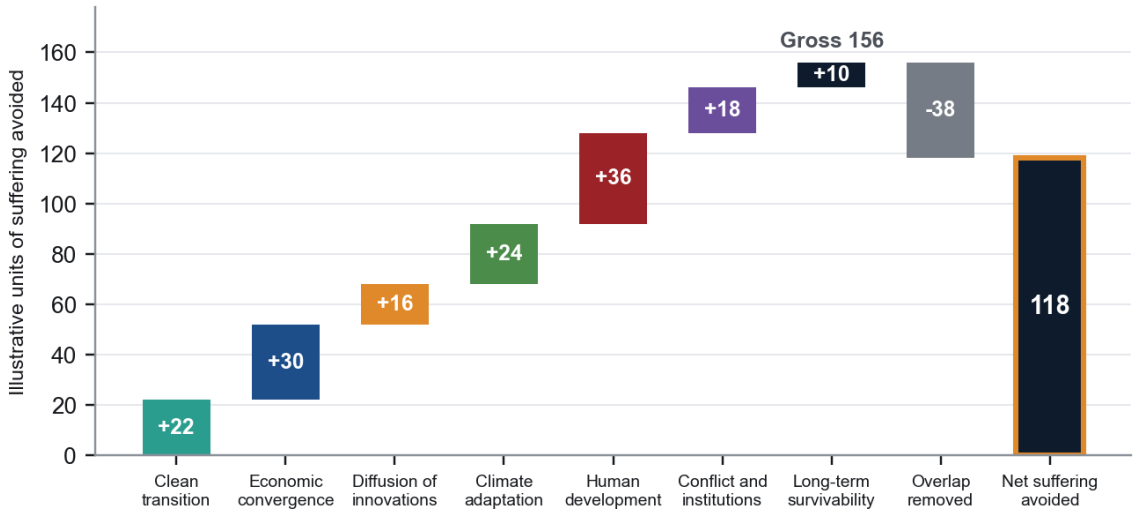
Rule	What it requires	Why it matters
1. Counterfactual	Compare with a credible baseline of what would have happened without the intervention.	Avoids crediting an intervention for trends already under way.
2. Direct and indirect effects	Count first-order benefits and the second-order effects they cause, such as higher income from better health.	Much of the value of intersectional investments is indirect.
3. Distribution	Report who benefits. Consider weighting gains to the worst-off more heavily, and always show unweighted and weighted results.	The same average gain can mean very different things for the poorest and the richest.
4. Uncertainty	Show ranges and scenarios, not a single number.	Prevents false precision.
5. Time	Count harm across generations. Be explicit about any discounting, and apply little or none to health and life.	Avoids undervaluing the future by default.
6. Risk shifting	Subtract any new harm created elsewhere, for example by displaced pollution or transferred hazard.	A benefit that moves a problem is not a benefit.
7. Overlap	Remove double-counting when several interventions claim the same avoided harm.	Prevents total claims from exceeding total harm.

Source: H Heuristics. Rules 1 and 7 follow standard practice in evaluation; rules 3 and 5 involve ethical choices that should be made explicit.

8.4 A hypothetical illustration

Figure 8 shows how the calculation would work for a hypothetical portfolio spread across all seven pillars. The numbers are invented to illustrate the logic. Gross benefits claimed by the seven pillars add to 156 units. Because many benefits are claimed by more than one pillar (for example, a reduction in child deaths from clean cooking would be claimed by both the clean transition and human development), 38 units are removed as overlap. The net figure is 118, which is the quantity that would be compared with the portfolio's cost.

Figure 8. Cumulative human suffering avoided: a hypothetical calculation



Source: H Heuristics (hypothetical, grade D). Units are arbitrary and not intended to represent any real portfolio.

The example makes three practical points. The overlap adjustment is large, and ignoring it would overstate the benefit by about a third. Pillars with large gross benefits such as human development are the ones most likely to overlap with others, so a sound analysis depends on assigning credit with care. And the final measure is a number that can be compared across very different options, such as a wastewater plant, a school, a conflict-mediation program and a seed-bank, which would otherwise be hard to rank.

8.5 Using the measure responsibly

- **Treat it as a decision aid, not an oracle.** The measure is only as good as the data and the assumptions behind it, and it should be reported with its ranges.
- **Keep the dashboard alongside the total.** A single number hides what it combines. Nine dimensions in **Table 15** should always be reported separately too.
- **Be careful about Goodhart's law.** When a measure becomes a target it can stop being a good measure. Metrics that can be gamed, such as deaths ‘averted’ from modeled counterfactuals, should be audited independently.
- **Make value choices explicit.** Equity weights and discount rates are ethical choices. They should be published, justified and tested for sensitivity, not buried.

Existing tools already do part of this. Disability-adjusted life years combine deaths and illness in a single unit (Murray and Lopez, 1996), social cost of carbon estimates monetize some climate harms, and cost-benefit analysis in disaster risk reduction has long counted avoided losses. Cumulative human suffering avoided would extend these to a common frame across the seven pillars. The report proposes it as a research and measurement program, not as a finished methodology.

PART III · MEASUREMENT AND TIME

9. A Century of Resilience

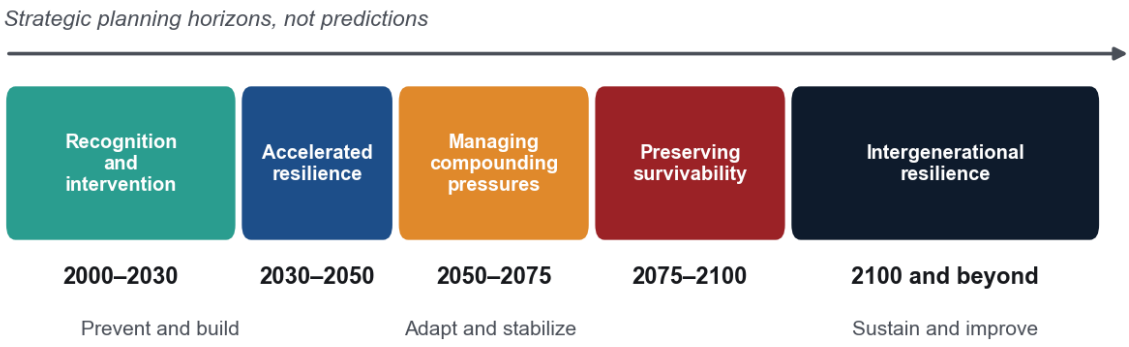
IN BRIEF

- Polycrisis Resilience should not be restricted to the immediate consequences of this decade's crises. Its ambition is to reduce cumulative suffering across multiple generations.
- Five planning horizons run from 2000 to 2100 and beyond; they are strategic horizons, not predictions.
- In a stylized model, advancing all pillars together lowers cumulative suffering by about 46% against drift, compared with about 28% for partial, siloed progress.

9.1 Five planning horizons

Figure 9 and Table 17 set out five planning horizons. They are strategic planning horizons, not predictions that particular outcomes will occur by those dates. They are intended to help organize priorities over time and to remind decision-makers that the choices of this decade shape conditions for people who will live in the next.

Figure 9. A century of resilience: five planning horizons



Source: H Heuristics. These are strategic planning horizons, not predictions that particular outcomes will occur by those dates.

Table 17. Planning horizons and priorities

Horizon	Focus	Typical priorities
2000–2030 Recognition and intervention	Understand interconnected global risks, accelerate clean technology adoption and address existing development deficits.	Map risks and vulnerabilities; scale proven clean and health technologies; close energy, water and health access gaps; build adaptation and early warning.
2030–2050 Accelerated resilience	Expand economic convergence, clean infrastructure, climate adaptation, healthcare and institutional capacity.	Finance convergence at lower capital cost; clean industrialization; resilient cities and food systems; universal essential services.
2050–2075 Managing compounding pressures	Strengthen systems against accumulated environmental pressures, demographic shifts, resource constraints and emerging risks.	Adaptation to locked-in change; ageing and migration; circular resource systems; governance of new technologies; critical infrastructure redundancy.
2075–2100 Preserving survivability	Maintain habitable environments, functioning institutions, resilient infrastructure and the capacity to address future systemic threats.	Protect planetary boundaries; sustain institutions; monitor and respond to catastrophic risk; keep options open.

Horizon	Focus	Typical priorities
2100 and beyond Intergenerational resilience	Preserve and continually improve the conditions for human well-being and civilization over longer timescales.	Transmit knowledge and institutions; avoid irreversible harm; continue improving living conditions.

Source: H Heuristics. Strategic planning horizons, not predictions.

The horizons have a logic. The early horizons concentrate on *prevention and building*, when the cost of acting is lowest relative to the cost of lock-in: infrastructure built now will last for decades, so building it clean and resilient is cheaper than retrofitting. The middle horizons concentrate on *adaptation and stabilization*, when accumulated pressures and demographic change are expected to test systems. The later horizons concentrate on *sustaining and improving*, when the main task is to keep the conditions for human well-being in place and to pass them on.

9.2 Three scenarios to 2100

To explore how the pillars interact over time, the report uses a deliberately simple stylized model. It is not a forecast. It encodes four assumptions: that unmitigated environmental pressure rises over time and may peak mid-century as stresses compound; that the clean transition reduces that pressure; that economic convergence, adaptation and institutional capacity each reduce vulnerability; and that each pillar advances at a speed determined by the scenario. The annual suffering index is the product of pressure and vulnerability, set to 100 in 2025.

SCENARIO A

Fragmented drift

Pillars advance slowly and unevenly. Clean technology spreads at a modest pace, convergence stalls for many countries, adaptation finance stays far below needs and institutions weaken under repeated shocks. Pressures peak mid-century and decline only slowly.

Potential outcome: *The annual suffering index is 108 in 2050 and 64 in 2100; the cumulative total is the baseline for comparison.*

SCENARIO B

Siloed progress

The clean transition and economic growth advance quickly, as in recent years, but adaptation, health systems and institutional capacity continue to lag. Pressure falls but vulnerability stays high in the places most exposed.

Potential outcome: *The index falls to 75 by 2050 and 44 by 2100; cumulative suffering is about 28% lower than in scenario A.*

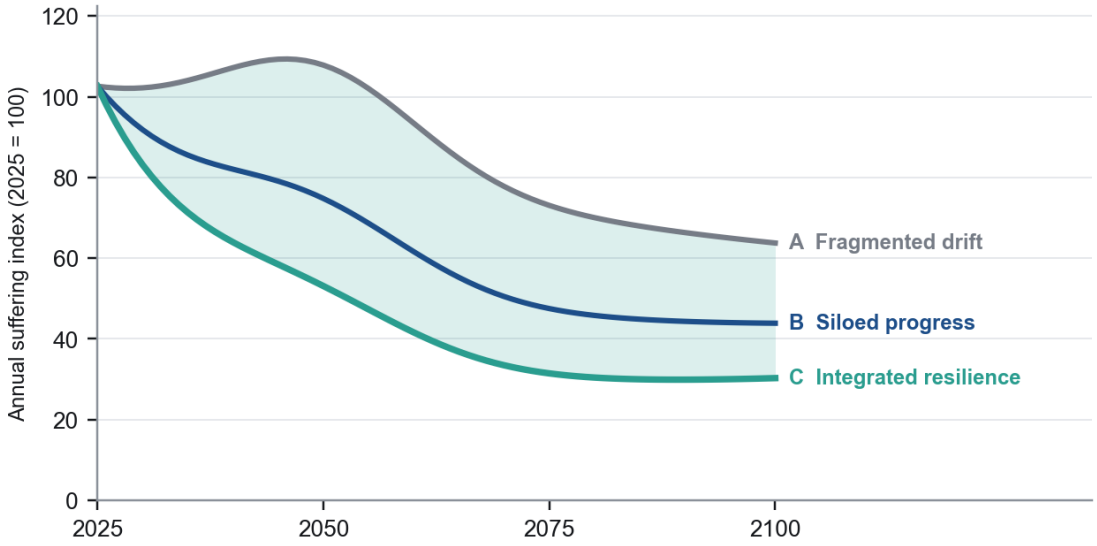
SCENARIO C

Integrated resilience

All seven pillars advance together. Clean transition and convergence proceed at the pace of Scenario B, and adaptation, human development and institutions advance at similar speed. Vulnerability falls as pressure falls, so the effects compound.

Potential outcome: *The index falls to 53 by 2050 and 30 by 2100; cumulative suffering is about 46% lower than in scenario A.*

Figure 10. Annual suffering index under three scenarios: a stylized model



Source: H Heuristics stylized model (grade D). The shaded area is the cumulative suffering avoided by Scenario C compared with Scenario A. Not a forecast.

The result is intuitive rather than surprising, but the size of the effect is instructive. Moving from drift to siloed progress, which resembles an extension of recent strengths in clean energy and growth, removes about 28% of cumulative suffering in the model. Moving from siloed progress to integrated resilience removes a further 18 percentage points. Most of the extra gain comes from lowering vulnerability, which the siloed path leaves largely unaddressed. The model shows how that arithmetic works. It does not show that those particular numbers will occur.

Limits of the model

The model has only four drivers, uses assumed effect sizes and speeds chosen by the author, treats pillars as independent contributors in a multiplicative form, and does not model regions, shocks, tipping points, politics or population change. Its purpose is to show the logic of combination, and its numbers should not be quoted as estimates. A serious version would be built from region-specific data, test alternative assumptions, and include uncertainty ranges.

PART III · MEASUREMENT AND TIME

10. Criticisms, Limits and What Would Change Our Minds

IN BRIEF

- A framework this broad invites serious objections, and several are well founded.
- The strongest concerns are measurement, breadth and the uneven evidence for some pillars.
- The framework commits to revising its claims if specified evidence contradicts them.

10.1 Principal criticisms and responses

Table 18. Criticisms of the framework and H Heuristics responses

Criticism	Response
Suffering cannot be measured. It is subjective, and proxies miss much of it.	Agreed that no measure captures it fully. The framework uses transparent proxies, reports ranges, keeps a multi-dimensional dashboard, and treats the number as an aid to judgment.
It is too broad. If development, technology, climate and institutions are all pillars, the framework risks claiming everything and being testable on nothing.	The framework makes specific claims (**Table 7**) that can fail, defines a measure, and sets out a test (Chapter 11). Breadth is a response to the thing studied: harm that arises from interaction.
Aggregation hides injustice. A total can rise while the worst-off are left behind.	Distribution is a defining property. The accounting rules require reporting who gains and allow equity weights.
Growth-based convergence conflicts with planetary limits. Critics from degrowth and ecological economics argue that raising living standards globally will exceed environmental limits.	A serious concern. The framework's answer is that convergence must be sustainable (Chapter 4) and that it prioritizes essential services for those who lack them over consumption growth. Whether decoupling is fast enough is an open empirical question.
It is technocratic. Politics, power and local agency are underrated.	Fair. Institutions and distribution are pillars precisely because outcomes depend on politics. Local ownership is a design requirement for diffusion and adaptation.
Long-term focus can excuse neglect of the present.	The framework counts present suffering fully, prefers measures with present benefits, and keeps near-term and long-term indicators side by side.
Technology optimism. Innovation will not diffuse by itself and carries its own risks.	Diffusion is treated as a policy problem, not an inevitability, and technological risks sit in the seventh pillar.
Evidence is uneven. Some links are well documented; others are plausible but thin.	True. Evidence grades make this explicit. Chapter 11 includes a research agenda aimed at the thinnest links.

Source: H Heuristics.

10.2 Evidence quality across the pillars

Table 19 summarizes the current strength of evidence for the central claim of each pillar. It is a candid account of where the framework rests on firm ground and where it rests on argument.

Table 19. Strength of evidence for each pillar's central claim

Pillar	Central claim	Grade	Main uncertainty
1. Clean transition	Cleaner systems lower several linked risks together.	A/B	Local and supply-chain side effects; pace in lower-income countries.
2. Economic convergence	Narrowing gaps reduces vulnerability to interconnected crises.	B/C	Whether catching up can be sustained and made clean; role of inequality within countries.
3. Diffusion of innovations	Faster adoption reduces vulnerability, especially where it is deliberately inclusive.	B/C	Which diffusion policies work at scale.
4. Adaptation	Adaptation substantially reduces climate harm and pays for itself.	B	Limits to adaptation; maladaptation; finance.
5. Human development	Health, education, nutrition and sanitation reduce suffering and raise resilience.	A	Delivery in fragile settings; financing.
6. Conflict and institutions	Prevention and institutional capacity reduce harm.	C	Causal pathways; measuring institutional resilience.
7. Long-term survivability	Catastrophic risks deserve deliberate attention and mitigation.	C/D	Probabilities highly uncertain; tractability of interventions.

Source: H Heuristics assessment of the literature.

10.3 What would change our minds

A framework should state what evidence would lead it to change. H Heuristics will revise the framework, or specific claims in it, if the following are shown.

- Interventions that reduce vulnerability to one hazard systematically increase vulnerability to others, so that the pillars cannot be pursued together.
- Income convergence between countries does not reduce vulnerability to climate and other shocks once other factors, such as institutions and inequality, are controlled for.
- Reported suffering avoided cannot be estimated with reasonable agreement across independent analysts, so that the measure does not guide decisions better than simple dashboards.
- The investments of the pillars, taken together, offer lower returns in human welfare than a smaller set of targeted interventions, such as health and nutrition alone.
- Planning for very long horizons demonstrably crowds out present-day suffering reduction, instead of complementing it.

PART III · MEASUREMENT AND TIME

11. Agenda for Action and Research

IN BRIEF

- Each class of actor has a distinct role in the framework.
- The Polycrisis Resilience Test gives seven questions for any policy, investment or program.
- The research agenda targets the thinnest links and the measurement challenge.

11.1 What different actors can do

Table 20. Roles by actor type

Actor	Priorities
National governments	Map vulnerability and exposure; align development, energy, health and adaptation plans to a shared suffering-reduction objective; protect essential services during crises; invest in prevention.
Multilateral banks and development finance	Lower the cost of capital for clean and resilient investment in emerging economies; finance multi-benefit projects; expand grants and concessional funding for adaptation; address debt burdens that crowd out resilience.
Donors and philanthropy	Fund proven, scalable solutions in health, nutrition, water and energy; support data and measurement; fund prevention and early action, not only response.
Companies and investors	Build clean and resilient assets; extend technology and services to underserved populations; assess supply-chain exposure; disclose climate and hazard risks.
Researchers and statisticians	Test the links between pillars; improve the data in the poorest countries; develop and validate measures of suffering avoided; publish open data and methods.
Communities and civil society	Shape local priorities; provide knowledge of local conditions; hold institutions accountable; deliver services and early warning at the last mile.

Source: H Heuristics.

11.2 The Polycrisis Resilience Test

Any policy, investment or program can be assessed with seven questions. A strong proposal answers yes to most and has a clear plan for the rest.

Table 21. The Polycrisis Resilience Test

#	Question
1	**Suffering.** Does it reduce a specific, measurable form of human suffering, and for whom?
2	**Prevention.** Does it prevent harm at its source rather than only respond to harm after the fact?
3	**Vulnerability.** Does it reduce the vulnerability of the most exposed people, not only average risk?
4	**Intersection.** Does it reduce more than one risk, or strengthen more than one pillar?
5	**Sustainability.** Does it avoid creating new pollution, lock-in, debt or hazard exposure?
6	**Durability.** Will it still work under stress, and can institutions maintain it?
7	**Time.** Does it count harm over decades and avoid shifting risk to later generations or other places?

Source: H Heuristics.

11.3 A research agenda

- **Measurement.** Develop and test methods for cumulative human suffering avoided, including overlap adjustment, equity weighting and uncertainty reporting, and compare them with existing tools.
- **Causal links.** Strengthen the evidence on the links shown in Chapter 7, especially between economic convergence and vulnerability, and between institutional quality and disaster mortality.
- **Multi-benefit evaluation.** Run rigorous evaluations of integrated investments, such as clinics with solar power and cooling, against single-purpose alternatives.
- **Compounding risks.** Build empirical, regionally resolved models of how hazards co-occur on the same populations; replace the stylized model in Chapter 9.
- **Finance.** Quantify how much lower capital costs and debt relief would add to resilience investment, and which instruments work.
- **Distribution.** Study which diffusion and adaptation programs reach the poorest, and why some do not.
- **Long-term risk.** Improve the evidence base and governance options for catastrophic risks, and test whether long-horizon planning complements or competes with near-term work.

11.4 Conclusion

The world faces risks that are increasingly tied together, and the harm they cause accumulates. A response that treats each risk, sector and decade as separate will miss much of what matters. Polycrisis Resilience proposes a different organizing idea: take the reduction of human suffering as the objective, treat economic convergence, technology diffusion, clean transition, adaptation, human development, institutional strength and long-term survivability as complementary mechanisms, and judge them by what they achieve for people across generations.

> **THE FRAMEWORK'S DISTINCTIVE PROPOSITION**
>
> Development, technological progress and environmental sustainability can be understood as components of a larger human survivability strategy, and their value is measured by the amount of human suffering they prevent.

The framework is a proposal for evaluation: its claims are graded, its numbers labeled and its limits stated. The question it poses is how to reduce the suffering the polycrisis would otherwise cause.

Glossary

Adaptive capacity	The ability of people, communities and institutions to adjust to hazards, take advantage of opportunities and cope with consequences.
Cascade	A failure in one system that triggers failure in another.
Common driver	A single underlying cause that produces stress in several systems at once.
Compounding	Several stresses falling on the same people or places at the same time.
Cumulative human suffering avoided	The total reduction in avoidable harm to human life, health, security and opportunity, across people and years, attributable to an intervention compared with a counterfactual.
Economic convergence	The narrowing of gaps in living standards, productive capacity, infrastructure and access to services between developed and developing economies.
Exposure	The presence of people, assets and ecosystems in places where they could be harmed by a hazard.
Maladaptation	Action meant to reduce climate risk that increases risk or vulnerability elsewhere or later.
Planetary boundaries	Limits within which humanity can operate safely with respect to nine Earth-system processes, such as climate, biodiversity and freshwater.
Polycrisis	A cluster of related crises whose interactions produce effects greater than the sum of the parts.
Polycrisis Resilience	The effort to minimize human suffering, preserve human survivability and improve long-term conditions in an increasingly interconnected world of systemic risks.
Resilience	The capacity of a system to absorb disturbance, adapt and recover. In this framework, valued by the human suffering it prevents.
Systemic risk	The risk that failure in one part of an interconnected system spreads and causes widespread harm.
Vulnerability	The propensity of people or systems to be harmed, shaped by poverty, inequality, governance, infrastructure and exposure.

References

Bostrom, N. (2013). Existential risk prevention as global priority. *Global Policy*, 4(1), 15–31.

Comin, D. and Hobijn, B. (2010). An exploration of technology diffusion. *American Economic Review*, 100(5), 2031–2059.

Ember (2026). *Global Electricity Review 2026.* London: Ember.

FAO, IFAD, UNICEF, WFP and WHO (2025). *The State of Food Security and Nutrition in the World 2025.* Rome: FAO.

Gerschenkron, A. (1962). *Economic Backwardness in Historical Perspective.* Cambridge, MA: Harvard University Press.

Global Commission on Adaptation (2019). *Adapt Now: A Global Call for Leadership on Climate Resilience.* Rotterdam and Washington, DC: GCA and World Resources Institute.

Hallegatte, S., Bangalore, M., Bonzanigo, L. et al. (2016). *Shock Waves: Managing the Impacts of Climate Change on Poverty.* Washington, DC: World Bank.

Health Effects Institute (2025). *State of Global Air 2025.* Boston, MA: HEI.

Holling, C.S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4, 1–23.

International Energy Agency (2024). *Reducing the Cost of Capital: Strategies to Unlock Clean Energy Investment in Emerging and Developing Economies.* Paris: IEA.

International Energy Agency (2026). *Global EV Outlook 2026.* Paris: IEA.

International Energy Agency (2026). *World Energy Investment 2026.* Paris: IEA.

International Renewable Energy Agency (2026). *Renewable Power Generation Costs in 2025.* Abu Dhabi: IRENA.

IPCC (2022). *Climate Change 2022: Impacts, Adaptation and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report. Cambridge: Cambridge University Press.

Janzwood, S. and Homer-Dixon, T. (2022). What is a global polycrisis? And how is it different from a systemic risk? Cascade Institute Technical Paper 2022-4.

Kahn, M.E. (2005). The death toll from natural disasters: the role of income, geography, and institutions. *Review of Economics and Statistics*, 87(2), 271–284.

Lancet Countdown on Health and Climate Change (2025). The 2025 report of the Lancet Countdown on health and climate change. *The Lancet.*

Lawrence, M., Homer-Dixon, T., Janzwood, S., Rockström, J., Renn, O. and Donges, J.F. (2024). Global polycrisis: the causal mechanisms of crisis entanglement. *Global Sustainability*, 7, e6.

Morin, E. and Kern, A.B. (1999). *Homeland Earth: A Manifesto for the New Millennium.* Cresskill, NJ: Hampton Press.

Murray, C.J.L. and Lopez, A.D. (eds.) (1996). *The Global Burden of Disease.* Cambridge, MA: Harvard School of Public Health.

Ord, T. (2020). *The Precipice: Existential Risk and the Future of Humanity.* London: Bloomsbury.

Rodin, J. (2014). *The Resilience Dividend: Being Strong in a World Where Things Go Wrong.* New York: PublicAffairs.

Rogers, E.M. (1962). *Diffusion of Innovations.* New York: Free Press.

SEforALL, IEA, IRENA, UNSD, World Bank and WHO (2026). *Tracking SDG 7: The Energy Progress Report 2026.* Washington, DC: World Bank.

Sen, A. (1999). *Development as Freedom.* Oxford: Oxford University Press.

Steinert, J., Stenzel, F., Virkki, V., Wendt-Potthoff, K., Wunderling, N. and Rockström, J. (2025). *Planetary Health Check 2025.* Potsdam Institute for Climate Impact Research.

Suri, T. and Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science*, 354(6317), 1288–1292.

Tooze, A. (2022). Welcome to the world of the polycrisis. *Financial Times*, 28 October.

Uppsala Conflict Data Program and PRIO (2026). *Conflict Trends: A Global Overview, 1946–2025.* Uppsala University.

UN IGME (2025). *Levels and Trends in Child Mortality: Report 2024.* New York: UNICEF.

United Nations (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development.* New York: UN.

United Nations and World Bank (2018). *Pathways for Peace: Inclusive Approaches to Preventing Violent Conflict.* Washington, DC: World Bank.

UNCTAD (2025). *A World of Debt 2025.* Geneva: UNCTAD.

UNDP (1994). *Human Development Report 1994: New Dimensions of Human Security.* New York: UNDP.

UNDRR (2025). *Global Assessment Report on Disaster Risk Reduction 2025: Resilience Pays.* Geneva: UNDRR.

UNEP (2025). *Adaptation Gap Report 2025.* Nairobi: UNEP.

UNESCO (2025). Out-of-school estimates, UNESCO Institute for Statistics and Global Education Monitoring Report.

UNHCR (2026). *Global Trends: Forced Displacement in 2025.* Geneva: UNHCR.

WHO and UNICEF (2025). *Progress on Household Drinking Water, Sanitation and Hygiene 2000–2024.* Geneva: WHO and UNICEF Joint Monitoring Programme.

WHO and World Bank (2025). *Tracking Universal Health Coverage: 2025 Global Monitoring Report.* Geneva: WHO.

World Bank (2024). *World Development Report 2024: The Middle Income Trap.* Washington, DC: World Bank.

World Bank (2025). *Poverty, Prosperity, and Planet Report* and Poverty and Inequality Platform update (global extreme poverty line of $3.00 a day, 2021 PPP).

World Economic Forum (2026). *Global Risks Report 2026.* Geneva: WEF.

World Meteorological Organization (2026). *State of the Global Climate 2025.* Geneva: WMO.