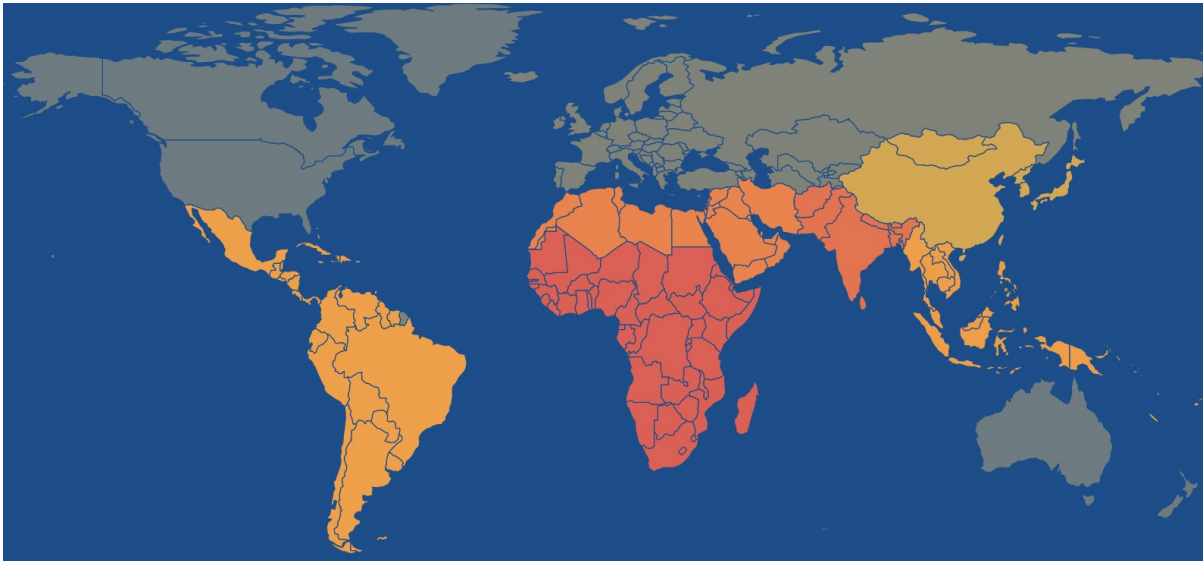


H HEURISTICS

Navigating a Changing World

The Polycrisis Apocalypse Humanity Is Facing

The Geography of Human Exposure, Demographic Inversion, and the Long Tail of an Unsafe Planet



Share of each region's population living in a Survivability Risk Region, 2100 weak-path scenario

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Abstract

This report examines the proposition that humanity's most probable catastrophe is not an event but a process: a **Polycrisis Apocalypse**, in which interacting crises accumulate faster than civilisation can repair them, the capacity to repair erodes, and a majority of people come to live in Survivability Risk Regions — places where pollution, humid heat, infrastructure breakdown, poverty, debt and conflict bind together on thin institutions. The condition then stabilises at unsafe levels, or slowly worsens, over centuries and millennia.

The report maps the geography of exposure, quantifies it (about 35% of humanity in such regions today; a majority by about 2050 and roughly 69% by 2100 on a weak path, against 22% on a buffered path), and shows how the demographic inversion — contraction in Europe and East Asia, growth in Africa and South Asia — shifts the exposure-weighted human toward the most stressed regions. In the Africa Ascendant demographic scenario, Africans account for 62% of Survivability Risk Region residents by 2500, and an African living in such a region becomes the single most common human circumstance. The analysis separates exposure from character: the arithmetic is one of capacity lagging growth, not of who people are.

Haiti, where compounded debt, environmental loss, disaster and armed-group capture have hollowed the state, is examined as the prototype of national collapse, and six of its preconditions are tested against a planetary version. Advanced weapons and societal turmoil are treated as discontinuity and capacity-loss channels. A long-tail model integrates person-years of exposure over 48,000 years, and finds that unsafe stabilisation can accumulate more suffering than extinction. The report closes with early-warning indicators and a programme of off-ramps, because every tier of risk has a lever that is cheaper now than after the 2040–2060 Danger Window.

Keywords: polycrisis; survivability risk; wet-bulb temperature; demographic inversion; Africa; Haiti; state fragility; exposure integral; tipping points; long-term risk

Classification: Q54, J11, O15, H56, N17, F51

Data and method: Observed figures are attributed inline to published sources (UN, WHO, IPCC, World Bank, FAO, UNHCR, IEA and peer-reviewed literature). Population figures to 2100 are rounded from the UN World Population Prospects 2024 medium variant. Everything beyond 2100, every Survivability Risk Region share and the exposure integral are H Heuristics scenario outputs built from the parameters in Appendix A; they are illustrations, not forecasts. The report is analytical, not predictive, and contains no investment advice.

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1. Executive Summary

The most likely end of the modern world is not a bang. It is a slow, uneven migration of most of humanity into places where staying alive becomes a daily negotiation with heat, poisoned air, failing states and falling buffers — followed by a very long stabilisation at unsafe levels, or a slow worsening, lasting centuries to millennia.

KEY FINDINGS

- **About 35% of humanity (2.9 billion people) already lives in a Survivability Risk Region (SRR)** — a place where two or more of the four risk tiers (pollution, functional heat, infrastructure breakdown, physiological limits) bind at once on low institutional capacity.
- **On a weak path, a majority of humanity is in an SRR by about 2050** (51%, 4.9 billion) **and roughly 69% by 2100** (7.0 billion). On a buffered path the share falls to about 22% by 2100. The fork is wide, and it is still open.
- **The exposed majority is increasingly African.** Africa holds 36% of SRR residents today, 48% by 2100 and 62% by 2500 in the Africa Ascendant demographic scenario. The single most common human circumstance — an African living in an SRR — overtakes every other category in the mid-22nd century and reaches 48% of all people by 2500.
- **The long tail is the point.** On the unsafe-stabilisation path, cumulative exposure reaches about 4.3 trillion person-years by 3000 CE — more than all human life lived to date (≈ 3.9 trillion person-years) — and keeps accumulating for as long as the state persists.
- **Haiti is a warning about mechanism, not about people.** Its collapse follows from an identifiable loop of extractive debt, environmental loss, repeated disaster, fiscal hollowing and armed-group capture. The same loop can run anywhere that capacity falls below stress for long enough.
- **The buffered path is real and cheap relative to the alternative** — but the cheapest window (2025–2040) is closing, and the Danger Window of 2040–2060 is when the choice locks in.

This report examines that proposition, which H Heuristics has called the **Polycrisis Apocalypse** ([Hughes 2026a](#); [2026b](#); [2026c](#)). It is not a prediction of an event. It is a description of a *process* in which interacting crises accumulate faster than civilisation can repair them, the capacity to repair erodes, and the resulting regression is measured not in years but in generations. The companion preprints ([Hughes 2026d](#), [Zenodo](#); [Hughes 2026e](#), [Figshare](#)) set out the long-tail argument in compact form. This report develops the geography, the demography and the case-study evidence, and attaches numbers to each.

The central claim has four parts. First, exposure to compound crisis is already large and sharply unequal: roughly 94% of humanity breathes air above the WHO guideline, about 3.4 billion people live in contexts the IPCC classifies as highly vulnerable to climate change, and around 2 billion live in fragile or conflict-affected settings. Second, the places where exposure is greatest are also the places where population is growing fastest, so the *exposure-weighted* human is moving steadily toward Sub-Saharan Africa and South Asia while the populations of Europe, East Asia and (in relative terms) North America age and shrink. Third, the technologies of destruction are becoming more capable at the same time that the political and

fiscal bases for restraining them are thinning. Fourth, Haiti — a society in which compounded debt, environmental loss, disaster and armed-group capture have hollowed the state — shows what the endpoint of that process looks like at national scale, and the question this report asks is under what conditions the same pattern could scale to the planet.

Report at a glance

Table 1. The report’s headline numbers

Measure	Value	Basis
Share of humanity breathing air above WHO PM _{2.5} guideline	≈94%	Observed (Tier A)
People highly vulnerable to climate change	3.3–3.6 billion	IPCC AR6 WGII
People living in fragile or conflict-affected situations	≈2 billion	World Bank
Humanity in an SRR, 2025	≈35% (2.9 bn)	Scenario model, calibrated to the ledger
Humanity in an SRR, 2050 (weak / buffered)	51% / 32%	Scenario model
Humanity in an SRR, 2100 (weak / buffered)	69% / 22%	Scenario model
Africa’s share of humanity, 2024 → 2100 → 2500	19% → 37% → 52%	UN WPP 2024 to 2100; Africa Ascendant beyond
Africans among SRR residents, 2025 → 2100 → 2500	36% → 48% → 62%	Scenario model
Cumulative SRR exposure to 3000 CE (S1 / S2 / S3)	0.7 / 4.3 / 2.7 trillion person-years	Scenario model

Observed figures are from the sources linked in the text. Scenario figures are H Heuristics model outputs (Appendix A) and are illustrative, not forecasts.

How to read this report

Sections 3 and 4 define the polycrisis and the four tiers of survivability risk. Section 5 maps and quantifies exposure. Section 6 sets out the demographic inversion and Section 7 asks what the median human will look like. Section 8 turns to weapons and social turmoil, Sections 9–11 to Haiti and the question of a ‘planetary Haiti’, and Section 12 to the long tail. Sections 13 and 14 offer early-warning indicators and off-ramps. Appendix A documents every scenario parameter, so that a reader who disagrees can change it and see the result.

2. Scope, Definitions and Method

What is being claimed

The Polycrisis Apocalypse, as H Heuristics uses the term, has three defining conditions: crises *interact* so that harm exceeds the sum of the parts ([Lawrence et al. 2024](#)); they *overwhelm* the management capacity of institutions; and the resulting condition *persists* for generations. It is not a single event, not a forecast, and not inevitable. It is a deliberately pessimistic scenario, constructed so that its mechanics can be inspected and its off-ramps found.

A **Survivability Risk Region (SRR)** is defined here as a place in which at least two of the four risk tiers described in Section 4 are chronically binding on a population whose institutions lack the fiscal, physical and administrative capacity to buffer them. The definition is deliberately stricter than ‘vulnerable to climate change’: a wealthy city exposed to heat is not an SRR if its grid, hospitals and treasury can hold; a poor city with the same heat is. Exposure and capacity must both be present.

Evidence tiers

The report mixes three kinds of statement and labels them throughout. **Observed** figures come from published sources (WHO, IPCC, UN, World Bank, FAO, UNHCR and peer-reviewed studies). **Projected** figures are the UN medium-variant population projections to 2100. **Scenario** figures — everything beyond 2100, the SRR shares, and the exposure integral — are H Heuristics model outputs built from stated parameters. The scenario figures are not findings about the world. They are arguments in numerical form, and their value lies in making assumptions explicit.

Table 2. The four pathways used in this report

Code	Pathway	Defining features
S0	Demography only	UN projections to 2100, then Africa Ascendant to 2500 (world ≈ 10.7 bn). No collapse dynamics: an accounting baseline.
S1	Buffered convergence	Tier A and B stress is met by clean-energy build-out, cooling, grid hardening, debt relief and adaptation finance. SRR share falls after 2040.
S2	Unsafe stabilisation	Capacity erosion outpaces repair. Population declines slowly; the SRR share rises to $\sim 85\%$ and stays there for tens of thousands of years.
S3	Endgame	As S2 but with re-industrialisation foreclosed and knowledge loss. Population falls to ≈ 1.4 bn by 3000 CE and toward extinction over 30,000–50,000 years.

S0 is a reference line, not a scenario of collapse. S1–S3 share the same population to the 2080s and diverge afterwards.

A note on framing

Two claims are easy to confuse, and this report keeps them apart. The first is a claim about **exposure**: that the places where the polycrisis bites hardest are home to a rising share of humanity. The second would be a claim about **people** — that some population is by nature less able to sustain a complex society. The report makes no such claim, and the evidence runs against it. The historical record shows African, Asian, American and European societies each building, losing and rebuilding complexity. Haiti’s trajectory, examined in Section 9, is traceable to an identifiable sequence of external debt, occupation, dictatorship and environmental loss, not to the character of its people. What links exposure to demography is arithmetic:

the regions where fertility remains high are the regions with the lowest per-person fiscal capacity and the highest climate and pollution load.

The demographic shifts discussed in Section 6 likewise need precision. Population decline in Europe, East Asia and elsewhere is driven by sustained below-replacement fertility, population ageing and falling working-age cohorts. Migration and intermarriage redistribute *ancestry*; they do not reduce the number of people. The ‘dissolution’ of the modern West in this report therefore means something narrow and measurable — shrinking cohorts, rising dependency ratios and fiscal strain on the institutions that have historically financed global public goods — and not any claim about the worth of any group.

Limits

The long-run figures extend over 48,000 years, a horizon on which no demographic model has skill. The parameters in Appendix A are judgements. The SRR shares are not measured quantities; they are calibrated so that the 2025 value (about 35%) sits below the IPCC’s 3.3–3.6 billion ‘highly vulnerable’ count and above the roughly 2 billion in fragile settings, which brackets any plausible multi-tier definition. All claims about 2150 and beyond should be read as thought experiments with a disciplined structure.

3. Anatomy of the Polycrisis Apocalypse

KEY FINDINGS

- Collapse in an industrial, globally integrated civilisation has no historical precedent; the proposition is about **interaction**, not about any single hazard.
- Six forcing drivers act through six shared transmission channels (food, water, energy, credit, migration, information) and accumulate in four tiers of risk.
- The decisive variable is the **ratio of stress to repair capacity** — Tainter’s insight — and it is the ratio, not the stress alone, that determines whether a region becomes an SRR.
- Seven of nine planetary boundaries are breached (2025), so the system is being pushed on every axis at once.

A polycrisis differs from a bad decade in one respect: the shocks are causally linked. A drought cuts hydropower; reduced power curtails fertiliser and cold chains; food prices rise; governments with thin budgets cannot subsidise; unrest follows; capital flees; the currency falls and the debt service burden rises; and the treasury has less to spend on the drought response. The same sequence runs in reverse as each failure becomes the cause of the next. The concept has been developed by the [Cascade Institute](#) and formalised in [Lawrence et al. \(2024\)](#); the H Heuristics treatment is set out in [The Polycrisis Apocalypse: Cascading Collapse](#).

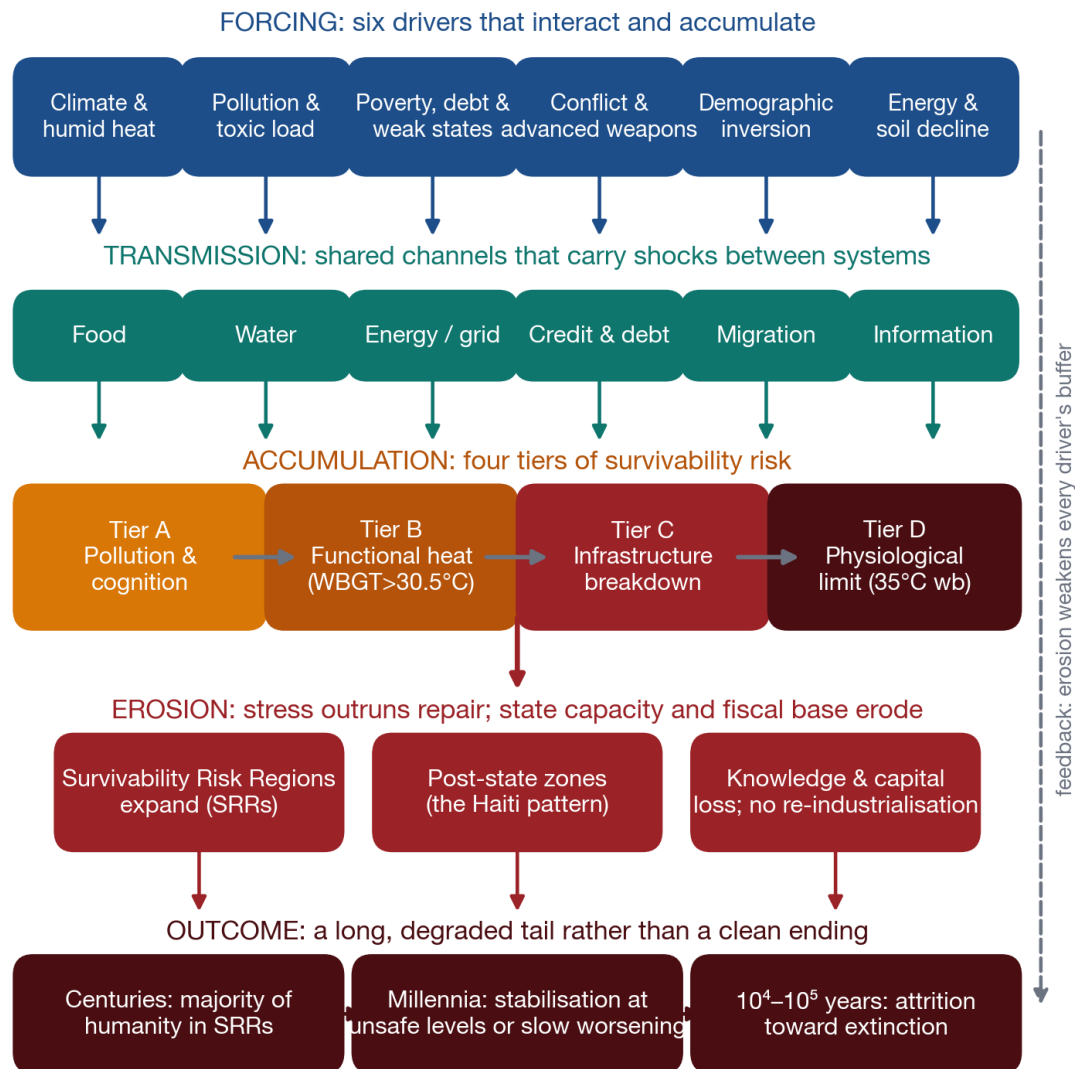


Figure 1. The architecture of the Polycrisis Apocalypse: forcing, transmission, accumulation, erosion, outcome.

Source: H Heuristics, conceptual. Tiers follow the Four Tiers of Survivability Risk framework.

Forcing: six drivers

Climate and humid heat. Warming already committed will persist for millennia: [Clark et al. \(2016\)](#) estimate that a large share of the warming and sea-level response to today's emissions is locked in for 10,000 years, and [Steffen et al. \(2018\)](#) argue that feedbacks may push the system toward a 'Hothouse Earth' trajectory. Humid heat is the most consequential expression for human life, discussed in Section 4.

Pollution and toxic load — fine particulates, lead, mercury, pesticides, microplastics and forever chemicals — degrades the biological and cognitive 'medium' through which every other capability diffuses.

Poverty, debt and weak states sets the buffers: where the treasury cannot repair roads, grids and clinics after shocks, every hazard converts into a permanent loss. **Conflict and advanced weapons** (Section 8) add both direct harm and the risk of a sharp nonlinear break. **Demographic inversion** (Section 6) moves

people, and therefore exposure, toward the places with the least buffer. **Energy and soil decline** matters for the long tail: the energy return on energy invested of the easily accessible fossil fuels that built industrial civilisation was historically very high, and the ease of that first energy has not been matched since (the quantitative size of the decline is contested — see [Hall et al. 2014](#) — but the direction is not).

Transmission and accumulation

Shocks do not pass between domains by magic; they pass through shared channels. Food, water, energy, credit, migration and information are the six that matter. They are what makes a heatwave in one region a price shock in another, and a debt crisis a food crisis. Section 4 describes the four tiers of risk that accumulate on this substrate. Importantly, the tiers are cumulative: functional damage (to cognition, labour and infrastructure) precedes physiological limits, which means that large populations are already suffering real, measurable survivability loss long before any headline temperature threshold is breached.

Erosion and the complexity trap

The concept that turns a stressed system into a collapsing one is Joseph Tainter’s (1988, [The Collapse of Complex Societies](#)): societies solve problems by adding complexity — institutions, specialisations, infrastructure — and that complexity has a maintenance cost. Past a point the marginal return on complexity turns negative; the society spends more keeping itself running than it gains from running. A polycrisis accelerates the approach by raising the cost of maintenance (more repair after every disaster) while eroding the revenue (a poorer, sicker, less productive population). H Heuristics has expressed this in the language of *stress versus repair*: when the stress rate exceeds the repair rate for long enough, capacity itself falls, which raises the next shock’s impact, which lowers capacity further.

The empirical record shows what ‘long enough’ can mean. Greece was without writing for roughly 450 years after the late-Bronze-Age collapse, as [Cline \(2014\)](#) and others document; the western Roman Empire’s fiscal and administrative decline took the city of Rome from about a million people to a few tens of thousands ([Ward-Perkins 2005](#)). Neither case involved a globally integrated industrial economy, and that is both the optimistic and the pessimistic reading: no such civilisation has yet collapsed, and none has yet been stressed on every axis at once.

Planetary boundaries

The planetary-boundaries framework supplies an overall ledger. [Richardson et al. \(2023\)](#) found six of nine boundaries transgressed; the H Heuristics ledger counts seven in 2025, against three in 2009. Crossing a boundary does not trigger a threshold event in the human sense. It means that the safe operating space has narrowed, so that the margin of every other system is smaller. In a polycrisis, margin is the thing that is spent.

4. The Four Tiers of Survivability Risk

KEY FINDINGS

- **Uninhabitable is a process, not a date.** Risk accumulates through four tiers; functional damage comes long before physiological limits.
- **Tier A (pollution and cognition) is already universal:** $\approx 94\%$ of people breathe air above the WHO guideline, and $\approx 2.1\text{--}2.3$ billion cook with polluting fuels.
- **Tier B (functional heat) expands now:** WBGT above 30.5°C makes sustained outdoor labour unsafe; the loss is workable months, not mortality.
- **Tier C (infrastructure breakdown) is the binding failure mode of the century:** grids fail before geography empties.
- **Tier D (35°C wet-bulb) is a tail, but a decisive one:** about 2.4 billion people exposed on weak paths late in the century versus fewer than 100 million on buffered paths.

The tier structure used in this report follows the H Heuristics *Build, Survive, Settle* series on survivability risk (see [Hughes 2026a](#)). It exists because the public imagination attaches ‘uninhabitable’ to a single image — an empty city in a heat dome — and thereby misses the dominant harms, which are quieter and earlier.

Table 3. The four tiers at a glance

Tier	What fails	Threshold / measure	Status
A Pollution and cognition	Lungs, hearts, developing brains; learning and productivity	$\text{PM}_{2.5} > 5 \mu\text{g}/\text{m}^3$ (WHO); blood lead $\geq 5 \mu\text{g}/\text{dL}$	Universal today
B Functional heat	Outdoor labour, schooling, cognition	WBGT in sun $> 30.5^\circ\text{C}$	Expanding now
C Infrastructure breakdown	Grids, water pumping, cold chains, hospitals	Peak load beyond engineered margin	Binding mid-century
D Physiological limit	Thermoregulation itself	Wet-bulb $\approx 35^\circ\text{C}$ theoretical; $\approx 30\text{--}31^\circ\text{C}$ for the young and healthy in lab tests	Tail risk; decisive late

Tier thresholds: WHO Air Quality Guidelines (2021); NIOSH/ISO WBGT occupational limits; [Sherwood & Huber (2010)](<https://www.pnas.org/doi/10.1073/pnas.0913352107>) and [Vecellio et al. (2022)](<https://journals.physiology.org/doi/full/10.1152/japplphysiol.00738.2021>) for wet-bulb limits.

Tier A: pollution and the human medium

Air pollution is the most pervasive survivability risk and the least cinematic. The [Health Effects Institute’s State of Global Air](#) attributes about 8 million deaths a year to air pollution in all its forms; the [WHO database](#) shows that around 99% of people breathe air above at least one of its guideline values (about 94% by the stricter $\text{PM}_{2.5}$ count used in the H Heuristics Tier A series). Household air pollution from cooking with solid fuels affects about 2.1–2.3 billion people ([IEA](#)). Lead is a separate and underweighted channel: [UNICEF and Pure Earth \(2020\)](#) estimated that roughly one in three children — around 800 million — have blood-lead levels at or above $5 \mu\text{g}/\text{dL}$, the level at which cognitive and developmental damage is documented.

The consequence is a continuous tax on the human medium. Cognitive drag in children, chronic respiratory and cardiovascular burden, and lost labour productivity lower the rate at which education, technology and institutions can diffuse. Pollution therefore matters for survivability well beyond its health toll: it reduces the capacity of the population to build the buffers that the other tiers will demand.

Tier B: functional heat

Tier B begins where heat and humidity make sustained outdoor work unsafe. Occupational standards place the threshold at a wet-bulb globe temperature of roughly 30.5°C in sun. Its first consequence is economic: agricultural, construction and logistics workers lose the hours on which wages depend. In the tropical belt, unsafe-labour days grow by months a year within a few decades. The tier is regressive: informal daily-wage workers lose income with no paid heat leave, and children's school calendars compress. A city can remain fully populated, and national GDP can continue to rise, while the human medium loses whole productive seasons.

A further, often-missed implication is that *where people live* is also *what people do*. Roughly half the labour force of Sub-Saharan Africa and much of South Asia is in agriculture or informal outdoor work, so Tier B reaches directly into household income. [Xu et al. \(2020\)](#) estimate that, on a high-emissions path with high population growth, around a third of humanity — about 3.5 billion people — could be living outside the temperature 'niche' that has hosted human settlement for six millennia by 2070.

Tier C: infrastructure breakdown

Tier C is where the polycrisis becomes mechanical. Hot weather raises cooling demand by 50–80% while it reduces transmission efficiency and forces thermal plants to throttle. The grid fails at the same moment that municipal water pumping, cold-chain refrigeration and hospital cooling are most needed. Preview events — the Pacific Northwest heat dome, the 2022 floods in Pakistan, repeated South Asian pre-monsoon blackouts — show that a weak grid converts a heatwave into a multi-system failure. The tier's allocation default is regressive: without deliberate planning, private enclaves secure continuous power while public systems fail.

Tier D: the physiological tail

Tier D is the best-known and least frequent. The theoretical human limit to sustained wet-bulb temperature is about 35°C ([Sherwood & Huber 2010](#)), though experiments by [Vecellio et al. \(2022\)](#) find that young, healthy adults reach physiological failure at wet-bulb temperatures of roughly 30–31°C in humid conditions, and that elderly and sick people fail lower. The Gulf, parts of South Asia and some low-lying tropical coastal cities are the early candidates. H Heuristics' working estimate is a fork: about 2.4 billion people exposed to episodic Tier D conditions late in the century on weak mitigation paths, against fewer than 100 million on buffered paths. The fork is the clearest single statement of what mitigation buys.

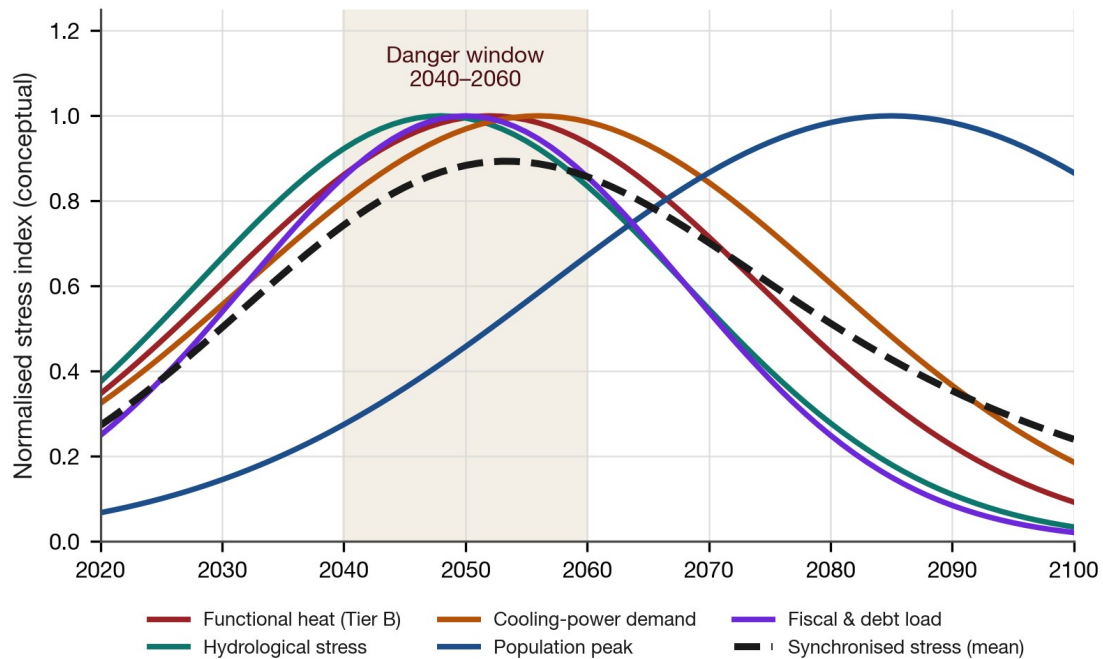


Figure 2. *The Danger Window (2040–2060): five stress curves synchronise into a structural bottleneck.*

Source: H Heuristics, conceptual normalised curves; shape follows the Danger Window analysis in the Build, Survive, Settle series.

The Danger Window, 2040–2060

The four tiers do not peak independently. Between roughly 2040 and 2060, functional heat, hydrological stress, cooling-power demand, fiscal load and the rising population overlap, with the global population peak (mid-2080s on UN projections) approaching behind them. Policy bandwidth narrows to crisis management, capital costs rise, and the choice between a wide buffer and a deep envelope locks in for generations. The model in Section 5 places the crossing from a minority to a majority of humanity in SRRs in this window on the weak path.

5. The Geography of Human Exposure

KEY FINDINGS

- **Exposure is concentrated and overlapping.** Twelve exposure categories each touch between 0.1 and 7.7 billion people; the overlaps, not the sums, define the SRR.
- **Two regions dominate:** Sub-Saharan Africa and South Asia hold 72% of SRR residents today and 74% in 2100 on the weak path.
- **The weak path crosses the majority line around 2050** (4.9 billion, 51%) and reaches 7.0 billion by 2100.
- **The buffered path is not a utopia:** even there 2.2 billion remain in SRRs in 2100, 65% of them African — buffering reduces the burden but does not remove the geography.

The exposure ledger

The first step in quantifying human exposure is to list what can be measured. Figure 3 sets out twelve published exposure counts, grouped by tier. The categories overlap heavily and must not be added. A child in rural Niger may be in five of them simultaneously. The ledger is nevertheless useful because it brackets the SRR: the multi-tier population cannot be smaller than the largest single stressed group that is also institutionally unbuffered, nor larger than the roughly 3.4 billion living in highly climate-vulnerable contexts plus the 2 billion in fragile settings minus their considerable overlap.

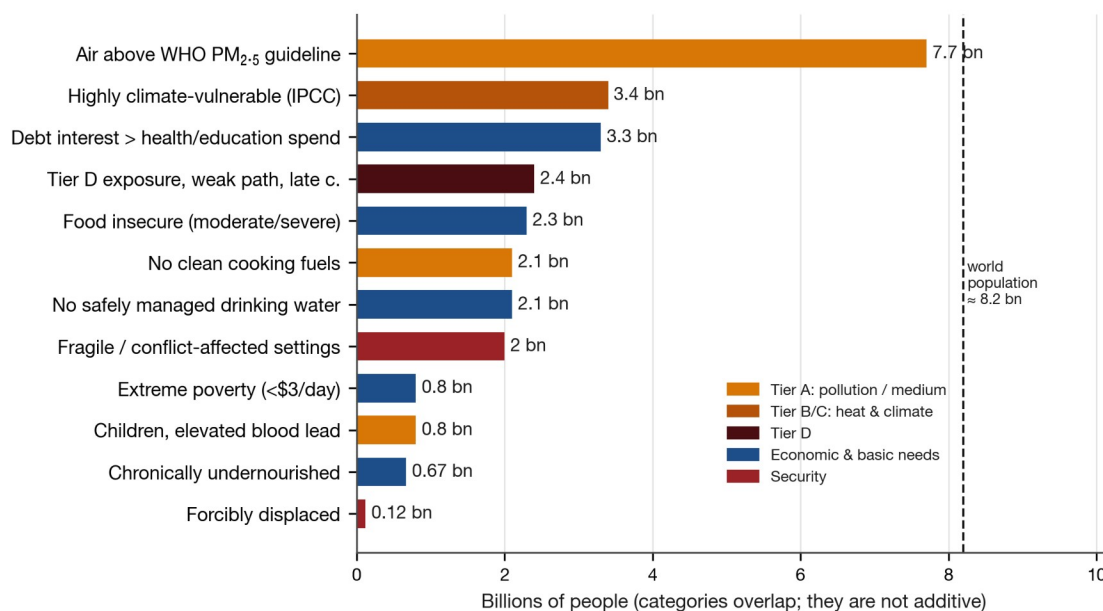


Figure 3. *The exposure ledger: billions of people affected by each published risk category (overlapping, not additive).*
 Sources: WHO; HEI State of Global Air; IPCC AR6 WGII; UNCTAD; FAO SOFI; JMP; IEA; World Bank; UNICEF/Pure Earth; UNHCR; H Heuristics for Tier D.

Table 4. Sources for the exposure ledger

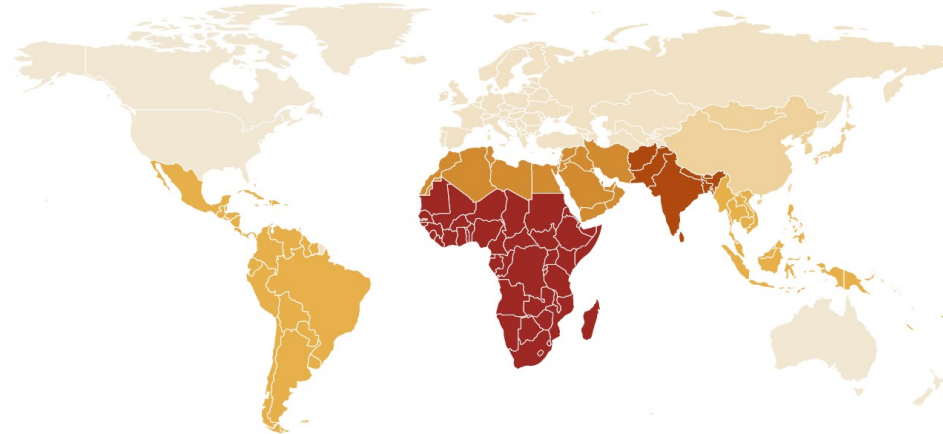
Category	People	Source
Air above WHO PM _{2.5} guideline	≈7.7 bn (≈94%)	WHO ; H Heuristics Tier A series
Highly vulnerable to climate change	3.3–3.6 bn	IPCC AR6 WGII
In countries where interest exceeds health or education spend	≈3.3 bn	UNCTAD, A World of Debt
Moderately or severely food insecure	≈2.3 bn	FAO SOFI
Without safely managed drinking water	≈2.1 bn	WHO/UNICEF JMP
Without clean cooking	2.1–2.3 bn	IEA
Fragile or conflict-affected settings	≈2 bn	World Bank
Elevated blood lead in childhood	≈0.8 bn	UNICEF / Pure Earth
Chronically undernourished	≈0.67 bn	FAO SOFI
Forcibly displaced	>0.12 bn	UNHCR

Rounded. Where sources vary by year or method, the central or most recent figure is used.

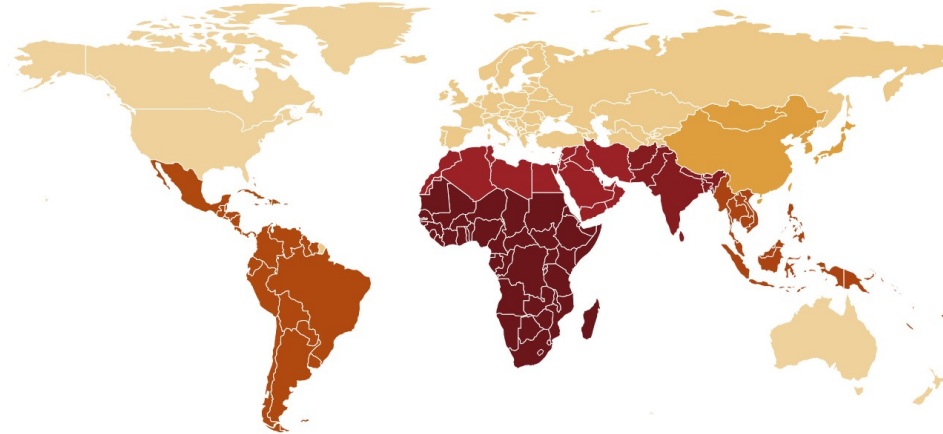
Mapping the Survivability Risk Region

Where does the ledger fall? Figure 4 shades each region by the share of its population assumed to live in an SRR, in 2025 and on the weak 2100 path. The geographic signature is unmistakable and consistent with every individual dataset: the belt that runs from West and Central Africa through the Horn and the Sahel, across the Arabian Peninsula and Iran into South Asia and mainland South-East Asia. The belt's core has four properties in common — high heat and humidity, high particulate and household-smoke load, high debt service relative to revenue, and high population growth.

2025: about 35% of humanity (2.9 bn) lives in a Survivability Risk Region



2100 weak-path scenario: about 69% (7.0 bn)



Share of regional population in a Survivability Risk Region (scenario parameter)

Figure 4. *Survivability Risk Regions: the share of regional population in an SRR, 2025 (top) and the 2100 weak-path scenario (bottom).*

Source: H Heuristics scenario model (Appendix A); country boundaries Natural Earth. Regional shares are parameters, not measurements.

Quantifying the population in SRRs

Table 5. Population and SRR exposure by region (millions)

Region	Pop. 2025	SRR 2025	Pop. 2100	SRR 2100 (weak)	SRR 2100 (buffered)
Sub-Saharan Africa	1,290	929	3,400	3,060	1,360
North Africa & West Asia	590	207	900	675	135
South Asia	2,070	1,139	2,550	2,091	561

Region	Pop. 2025	SRR 2025	Pop. 2100	SRR 2100 (weak)	SRR 2100 (buffered)
South-East Asia & Melanesia	690	173	700	406	56
East Asia	1,620	194	800	240	24
Latin America & Caribbean	660	165	630	347	50
Europe & Central Asia	825	41	700	105	7
North America & Oceania	427	13	495	59	5
World	8,172	2,860	10,175	6,983	2,198

Population: UN WPP 2024 medium variant, rounded and regrouped. SRR shares and resulting numbers: H Heuristics scenario, weak path. 2025 shares are common to all pathways.

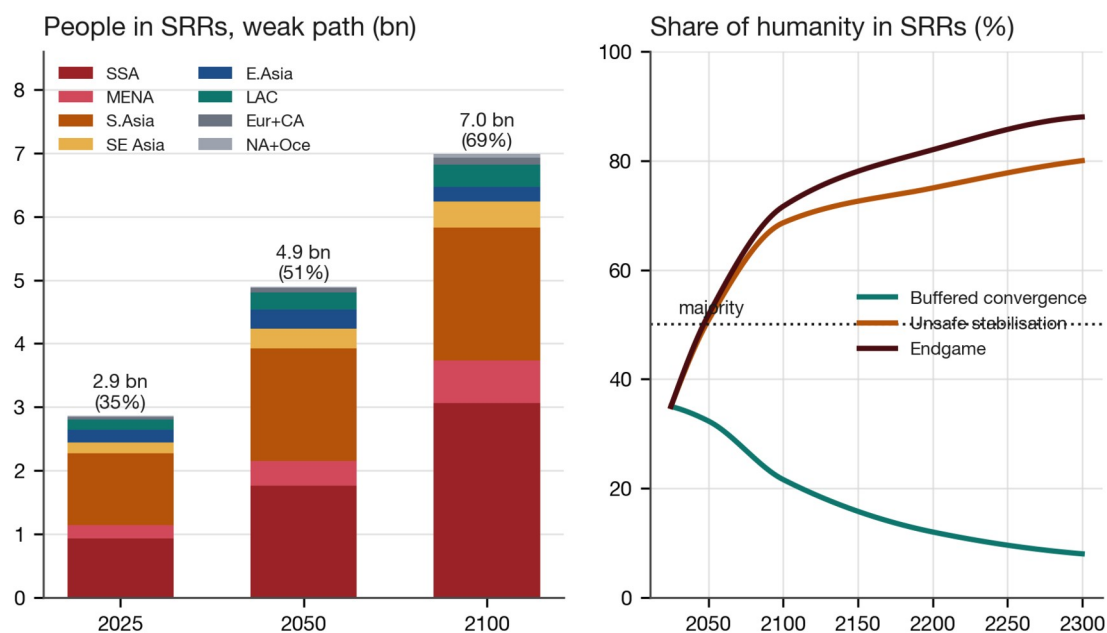


Figure 5. People in SRRs by region on the weak path, 2025–2100 (left); share of humanity in SRRs on the three pathways (right).

Source: H Heuristics scenario model. Population: UN WPP 2024 medium variant (rounded); SRR shares are scenario parameters.

The weak path puts 4.9 billion people in SRRs in 2050 — the first time they are a majority — and 7.0 billion in 2100. The buffered path keeps the number below 3.1 billion in 2050 and shrinks it to 2.2 billion in 2100. The difference between the two paths in 2100 is 4.8 billion people, more than twice the population of the entire planet in 1925. That is the scale of what the choices of the next two decades decide.

Two regional features deserve emphasis. First, **South Asia is the largest SRR region today** (1.1 of 2.9 billion) and remains the second largest in 2100; its exposure is dominated by Tier A (particulates), Tier B and Tier D (the Indo-Gangetic plain and Indus basin) and by monsoon-linked grid and water stress. Second, **Sub-Saharan Africa becomes the largest by mid-century**, because it combines the highest SRR share with the fastest population growth. By 2100, it alone accounts for 3.1 billion people in SRRs on the weak path — more than the entire planet’s SRR population today.

6. The Demographic Inversion

KEY FINDINGS

- **Africa's share of humanity rises from 19% (2025) to 37% (2100)** on UN projections, and passes one-half in the late 2350s in the [Africa Ascendant](#) scenario.
- **Fertility is the driver, and it is a gradient, not a binary:** Niger and DR Congo at 6, Nigeria at 4, India below replacement, and the EU, Japan, China and South Korea between 0.75 and 1.4.
- **Median age tells the same story:** about 19 in Africa and 43 in Europe today, converging only toward 2100.
- **Ancestry is a different variable from residence.** Prevalence of recent African ancestry spreads far wider than residence in Africa: $\approx 24\%$ of humanity today, $\approx 48\%$ in 2100 and $\approx 77\%$ by 2500 in the Africa Ascendant scenario.

The shape of the shift

The share of humanity living in Africa followed a U-shaped path over the last four centuries: about 13% in the 1600s, down to about 8% by 1920 as the slave trade and colonialism took their toll, back to roughly 13–14% by 2000, 19% today and — on the UN medium variant — about 37% in 2100 ([UN WPP 2024](#); [Africa Ascendant](#)). That growth is largely built in. Fertility is falling, but the cohort of women who will bear children over the next three decades is already born, and it is the largest in history. By 2100 Nigeria is projected at roughly 477 million, DR Congo at 431 million and Ethiopia at 367 million, with six further countries above 100 million.

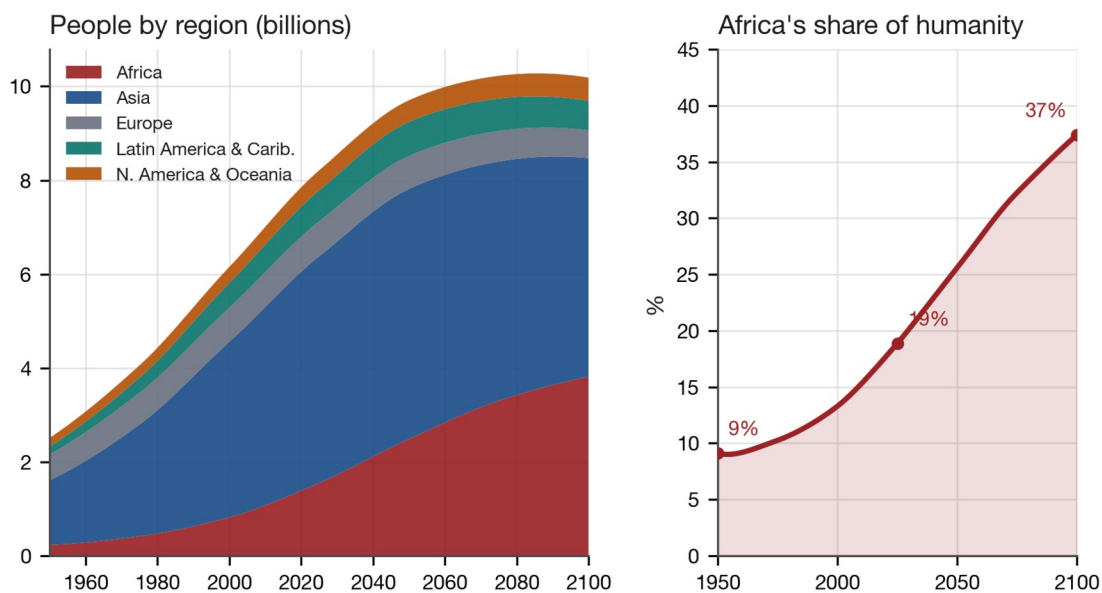


Figure 6. World population by region, 1950–2100 (left) and Africa's share of humanity (right).

Source: UN World Population Prospects 2024, medium variant, rounded and regrouped by H Heuristics.

The other half: contraction elsewhere

The same projections describe the opposite movement elsewhere. Europe's population is at or near its peak and falls from roughly 745 million to about 590 million by 2100. East Asia falls from about 1.6 billion to well under 1 billion, with China alone projected to fall by roughly half. Fertility in the European Union was about 1.4 children per woman in recent years ([Eurostat](#)), in Japan about 1.2, in China close to 1.0 and in South Korea about 0.75. Replacement is 2.1. A society at 1.4 loses roughly a third of each generation, absent immigration; at 0.75 it loses more than 60%.

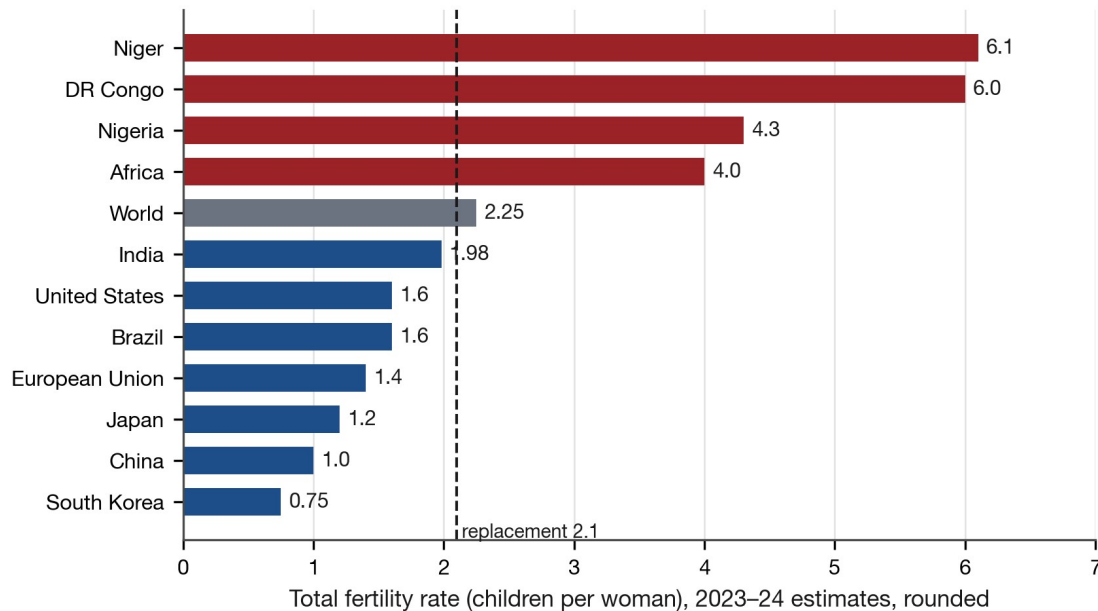


Figure 7. Total fertility rate (children per woman) in selected countries and regions, 2023–24 estimates.

Source: UN WPP 2024; Eurostat; national statistics. Rounded.

Falling fertility is not a failure of any society; it is the expected consequence of education, urbanisation and the lower cost of child survival. It nevertheless creates specific fiscal strains: ageing populations raise pension and health costs while shrinking the cohort that pays for them. For this report the relevant point is narrower. The regions that historically supplied most of the world's capital, technology, and concessional finance are the regions whose working-age cohorts are shrinking fastest. Official development assistance fell by about 23% in real terms in 2025, to \$174 billion ([OECD](#)); that is early evidence of the pressure, not its worst expression.

Migration, ancestry and prevalence

Migration is the third demographic force, and it must be kept analytically distinct from the first two. The African-born population living abroad rose from 6.8 million in 1990 to about 20.7 million in 2024 — about 1.4% of Africa's population — and the world's African-descended diaspora is much larger because it includes about 200 million people in the Americas whose ancestors were taken across the Atlantic (the [Africa Ascendant](#) report documents this in detail). Mixed ancestry spreads far more widely than residence.

[Bryc et al. \(2015\)](#)00476-5) found that about 3.5% of European Americans carry at least 1% African ancestry, and 12–13% in South Carolina and Louisiana.

The **prevalence-not-proportion** point from Africa Ascendant matters here. In a population in which a group making up a tenth of people mixes at moderate rates, the share of people with *some* ancestry from that group reaches 22% after five generations, 43% after ten and 67% after fifteen, while the average fraction of ancestry per person stays at 10%. Prevalence rises quickly; proportion does not. That is why the *ancestry* line in Figure 8 rises far faster than the *residence* line, and why a majority of humanity could carry some recent African ancestry long before a majority lives in Africa. Migration and mixing are therefore best understood as mechanisms that spread both lineage and exposure; they do not cause the population shrinkage that is documented in the fertility data.

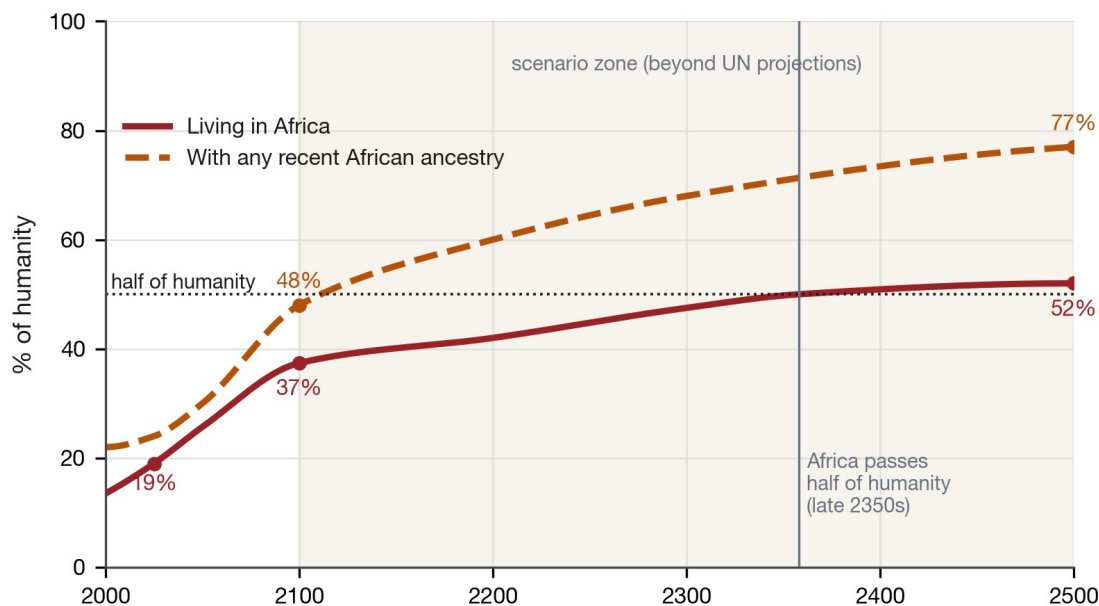


Figure 8. Share of humanity living in Africa and share with any recent African ancestry, 2000–2500.

Source: UN WPP 2024 to 2100; H Heuristics Africa Ascendant scenario (Africa fertility 2.14, rest of world 2.10) beyond. Ancestry series: scenario.

Why this matters for exposure

Demography determines *who* is exposed; it does not by itself determine whether exposure becomes catastrophe. A young Africa could be a source of growth, innovation and demographic dividend if investment in health, schooling, power and jobs keeps pace. The exposure arithmetic of this report simply notes that where the growth is, the buffers have so far lagged: Africa’s general government revenue is only 15–17% of GDP against more than 30% in the OECD ([OECD Revenue Statistics in Africa](#)). Population growth faster than capital deepening means a falling buffer per person. That is what puts exposure and demography on the same map.

7. The Median Human: Who Will Live in the Polycrisis?

KEY FINDINGS

- **The median person is already in a high-exposure setting**, and by about 2050 on the weak path is also inside an SRR (51% of humanity).
- **The most common single human circumstance** — an African living in an SRR — overtakes all others in the mid-22nd century and reaches 44% by 2300 and 48% by 2500.
- **The median human is African by residence only after the late 2350s**, but carries some African ancestry well before that: 48% in 2100, 68% in 2300.
- **The result is not a majority of one category but a plurality that dominates the middle of the distribution.** The middle 50% of humanity's experience is the Africa-in-an-SRR experience.

The proposition that motivates this section is that, centuries from now, the average human — or the middle 50% of humanity — is an African trapped in a survivability-risk region. It can be tested, within the limits of the scenario, by combining two things: Africa's share of humanity (Figure 8) and the share of each group living in an SRR (Section 5). Figure 9 does the sum.

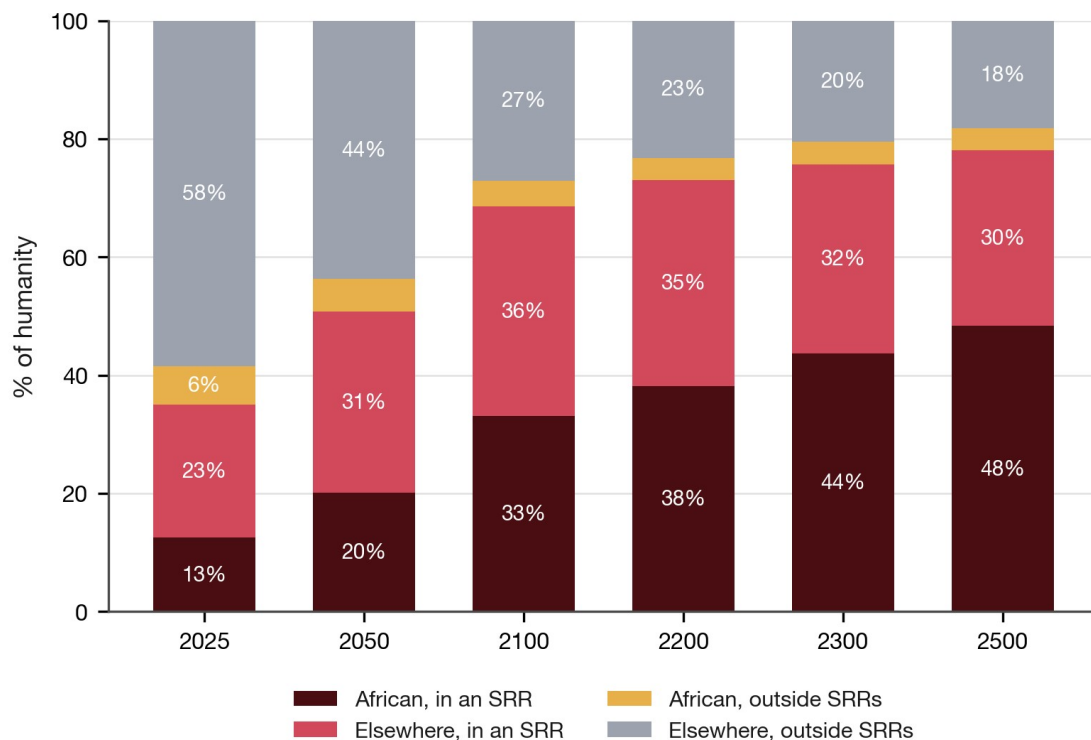


Figure 9. *Composition of humanity by residence and SRR status, 2025–2500 (Africa Ascendant demography; weak-path exposure).*

Source: H Heuristics scenario model. Africa's SRR share: 66% (2025), 78% (2050), 88% (2100), 91–93% thereafter; rest of world: 28%, 41%, 57%, 60–62%.

Table 6. Who is exposed: composition of humanity, weak-path exposure (percent of all people)

Year	Africa share	African, in SRR	Elsewhere, in SRR	All in SRR	Africans as share of SRR
2025	19%	13%	23%	35%	36%
2050	26%	20%	31%	51%	40%
2100	37%	33%	36%	69%	48%
2200	42%	38%	35%	73%	52%
2300	48%	44%	32%	76%	58%
2500	52%	48%	30%	78%	62%

Demography: UN WPP 2024 to 2100, Africa Ascendant after. Shares apply to the 'demography only' population; they would be unchanged if all groups were reduced proportionally in S2 or S3.

What the model says

Four findings follow. **First**, a majority of humanity is inside an SRR from about 2050 (51%), rising to 69% in 2100 and 78% in 2500. **Second**, Africans make up 36% of SRR residents today, 48% in 2100, a majority (52%) by 2200 and 62% by 2500. **Third**, the African-in-an-SRR category is the single largest by the mid-22nd century, and by 2300 it is larger than any other single category (44% against 32% and 20%). **Fourth**, and importantly for the claim as originally phrased, the category never exceeds a majority of all people (it peaks at 48% in 2500 on these assumptions), so the proposition holds in the *modal* sense, and in the *middle-of-the-distribution* sense once ancestry is taken into account, but not as a strict majority of one category.

Ancestry sharpens the point. If we ask not ‘where does a person live?’ but ‘does the person carry recent African ancestry?’, the answer is yes for about 48% of people in 2100, 68% in 2300 and 77% in 2500 on the Africa Ascendant assumptions. Combine this with the high SRR share in the regions that hold most of that ancestry and the middle 50% of humanity — the two quartiles around the median — has, in 2300, both a majority-African ancestry and a majority SRR residence. It is in this sense that the ‘average human’ becomes an African in an SRR. The statement is a demographic one; it concerns where and how people live, and is silent about who they are.

What this means for the polycrisis

A world whose median circumstance is the SRR is a world in which the *political economy* of the polycrisis changes. Today, the countries that hold most of the world’s wealth, technology and military power are also those whose populations are least exposed; the incentive to maintain a global safety net is intermittent. In the late 22nd century and beyond, the median voter, taxpayer, soldier and consumer of the planet’s governance live in conditions of chronic stress. That has two opposite implications. It could produce a world in which global public goods (clean energy, disease control, climate adaptation) are demanded by a majority and financed through reformed institutions. Or, if the capacity to finance them has eroded in the meantime, it could produce a world in which the majority has the demand but not the means — the condition Section 11 calls Planetary Haiti.

A caution about the numbers

The composition figures hold exposure shares fixed by group and let population shares do the work. They therefore describe the *relative* picture, not the absolute count, which depends on how fast total population falls in the S2 and S3 pathways (Section 12). They also assume that Africa's share of the SRR does not fall through economic convergence, which is precisely what the S1 pathway is designed to produce; on S1, Africa's SRR share in 2100 falls to about 37%, and the median human's circumstances are correspondingly better. The geography is a risk, not a destiny.

8. Advanced Weapons and Societal Turmoil

KEY FINDINGS

- **The weapons risk is nonlinear.** Roughly 12,200 nuclear warheads remain (down from $\approx 70,000$ in 1986) — enough to cause modelled famine deaths of up to ≈ 5 billion in a full US–Russia exchange.
- **The Doomsday Clock stands at 85 seconds to midnight** (January 2026), the closest on record.
- **State-based armed conflicts reached 65 in 2025**, the most since 1946, and about 120 million people are forcibly displaced.
- **Cheap, networked and autonomous weapons** lower the cost of violence for non-state actors precisely where state monopoly on force is weakest.
- **Turmoil is both a cause and a symptom of capacity loss:** conflict raises debt and displaces people; weak states lose the monopoly of force and become conflict zones.

The weapons dimension of the polycrisis is unusual because it is the one most likely to produce a *discontinuity*. Tiers A–D describe gradients. A nuclear exchange, an engineered pandemic or a cascading cyber-physical attack on grids and financial plumbing would be a step change, and in a stressed system would have a far larger consequence than in a buffered one.

Nuclear weapons

The global stockpile has fallen from a peak of about 70,000 warheads in 1986 to roughly 12,200 in 2025 ([Federation of American Scientists](#)), but the decline has stalled, arms-control architecture is eroding, and modernisation programmes are under way in every nuclear-armed state ([SIPRI](#)). The consequence that matters for survivability is not blast but climate: soot lofted by burning cities blocks sunlight and cuts crop yields. [Xia et al. \(2022\)](#) modelled global caloric production after nuclear war and found that a limited India–Pakistan exchange (about 5 teragrams of soot) could cause around 27 million famine deaths within two years, a large India–Pakistan war (about 47 Tg) roughly 2 billion, and a full US–Russia exchange (about 150 Tg) more than 5 billion. The countries most exposed to the resulting food shock are the net food importers with the weakest reserves — those already in the SRR belt.

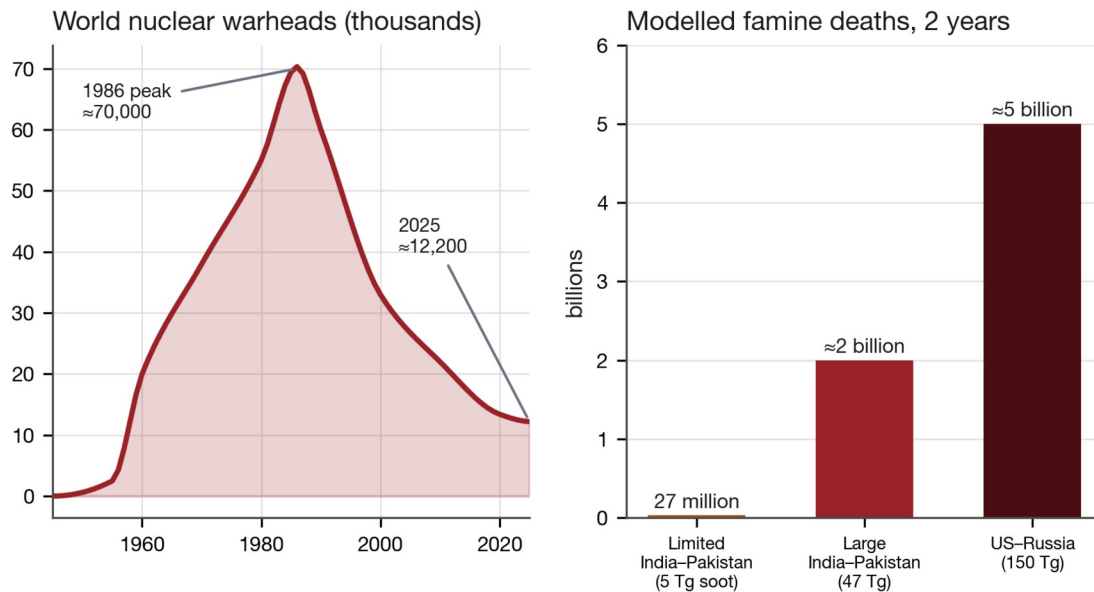


Figure 10. World nuclear warhead inventories, 1945–2025 (left) and modelled famine deaths from nuclear war (right).

Sources: Federation of American Scientists (approximate, rounded); Xia et al. (2022), Nature Food. The [Bulletin of the Atomic Scientists] (<https://thebulletin.org/doomsday-clock/>) set the Doomsday Clock at 85 seconds in January 2026.

Conventional, autonomous and cyber weapons

The more probable weapons threat is the diffusion of capability downward. Cheap drones, commercial satellite imagery, encrypted communications, 3D-printed parts and open-source targeting have lowered the cost at which non-state groups can contest territory and infrastructure. In states whose security forces are underpaid and under-equipped — and Haiti is the cautionary case (Section 9) — armed groups now routinely exceed the police in firepower. At the high end, autonomous targeting, offensive cyber operations against grids and water systems, and the spread of biotechnology capabilities raise the ceiling on what a determined actor can do. None of these has to be used by a state to matter: they change the cost of *holding* territory and therefore the structure of authority across large parts of the planet.

Turmoil as a capacity-loss accelerator

State-based armed conflicts reached 65 in 2025, the highest count since 1946, and forced displacement exceeds 120 million (UNHCR). Conflict is both an effect and a cause of the exposure in this report. It is an effect because heat, food-price spikes and fiscal collapse raise the probability of unrest. It is a cause because war destroys infrastructure, diverts budgets, displaces populations into more exposed locations, and — critically — removes the state's capacity to provide the services that keep the other tiers at bay. About 2 billion people already live in fragile or conflict-affected settings.

Social turmoil in the wealthy world is a separate, slower-acting channel. Political polarisation, declining trust in institutions, and the fiscal strain of ageing reduce the ability of the richest countries to sustain the concessional finance, technology transfer and diplomatic effort that a polycrisis requires. Rising nationalism and the retreat from multilateralism do more harm in a polycrisis than they would in normal times because the system is already at the limit of its coordination capacity. The 23% fall in aid in 2025 is

an early demonstration. These dynamics are not caused by any group of people; they are a function of ageing, unequal gains from globalisation, and the strain of a series of recent shocks.

The interaction with exposure

Weapons risk is therefore multiplied by the SRR geography. A regional war in a buffered area is a catastrophe but a recoverable one. The same war in an SRR, where food reserves are thin, the grid is fragile, and armed groups are already contesting territory, can tip a region from stress into post-state dissolution. This is the mechanism Section 9 describes in Haiti.

9. Case Study: The Collapse of Haiti

KEY FINDINGS

- **Haiti is the clearest contemporary example of the polycrisis at national scale:** about 90% of Port-au-Prince is controlled by armed groups, around 1.3–1.4 million people are internally displaced, and the economy has contracted every year from 2019 to 2024.
- **The mechanism is a loop,** not a trait: extractive debt (the 1825 indemnity), environmental loss, recurrent disaster, fiscal hollowing, armed-group capture, and skilled-labour flight.
- **Each turn of the loop lowers the capacity to stop the next.** That is the property that makes it a model for the planetary scenario.
- **Haiti is not destiny for any people.** Its history is a sequence of imposed and compounding shocks acting on a small, poor, ecologically fragile state.

Haiti is the case most often invoked in H Heuristics' work on the polycrisis ([Endgame](#)) and it deserves a careful reading. A fast reading — a Black republic that failed — is false, and its falsity matters for the planetary question. A slower reading shows a state that was handicapped from birth, repeatedly struck, and progressively hollowed until armed groups replaced its government in most of its capital.

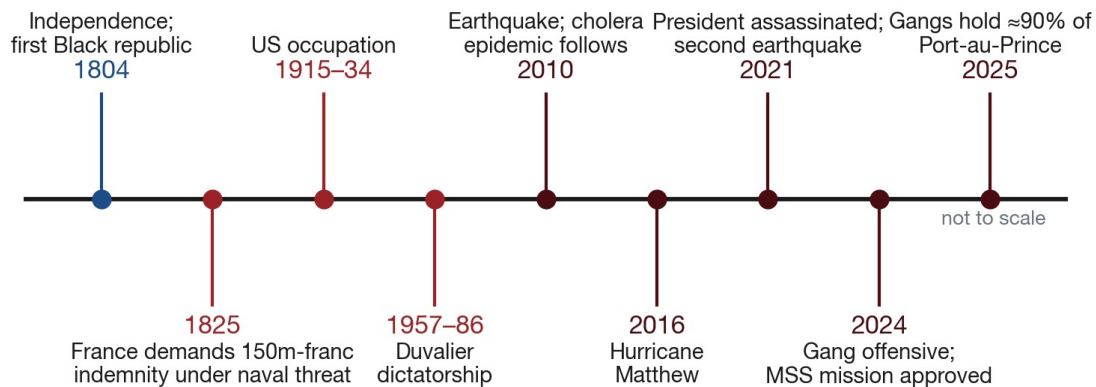


Figure 11. Haiti: selected shocks, 1804–2025 (not to scale).

Sources: World Bank; UN BINUH; IOM; historical record.

From the indemnity to the hollow state

Haiti's revolution (1791–1804) abolished slavery and created the first Black republic. It did not create the conditions to flourish. In 1825, France — with warships off Port-au-Prince — demanded an indemnity of 150 million francs for the 'loss' of the colony, a sum that was later reduced to 90 million but took until 1947 to repay, financed through French banks at punitive interest. For more than a century a large share of

Haiti's revenue went to external creditors rather than to roads, schools or public health. The United States occupied the country from 1915 to 1934 and took control of its customs and national bank. The Duvalier dictatorship (1957–86) added three decades of predation. By the time of the 1986 transition, the state's capacity to tax, police and provide services had been systematically depleted.

Environmental loss compounded the fiscal loss. The country has lost the great majority of its original forest — the United Nations and others cite figures above 95% for primary forest — which increases erosion, flood risk and landslides on steep terrain and degrades water supply and soil. The result is that the same hurricane that damages a forested island kills hundreds in Haiti. Most Haitian households still cook with charcoal or wood, the very activity that drives the deforestation.

The recent cascade

The pace of compounded shock accelerated in the 2010s. The January 2010 earthquake killed an estimated 100,000–300,000 people (estimates differ widely) and destroyed much of the capital's government infrastructure. A cholera epidemic introduced later that year killed about 10,000 and sickened some 800,000. Hurricane Matthew struck in 2016. The President was assassinated in July 2021; a second earthquake in August 2021 killed more than 2,000. No elected national official has held office since early 2023. In 2024, a coalition of armed groups attacked state institutions, the prime minister resigned, and a Kenya-led multinational security mission was deployed to support a police force that was badly outgunned by the gangs. By 2025 armed groups controlled roughly 90% of the capital, killed thousands a year and displaced well over a million people ([UN BINUH](#); [IOM](#)). About half the population faces acute food insecurity ([IPC](#)).

Table 7. Haiti at a glance

Indicator	Value	Source
Population	≈11.7 million	World Bank
Gross national income per head	≈\$1,700 (nominal, recent)	World Bank
Real GDP trend 2019–2024	Contracted every year	World Bank
Internally displaced people	≈1.3–1.4 million	IOM DTM
Share of Port-au-Prince under armed-group control	≈90%	UN BINUH
Population in acute food insecurity	≈5–6 million	IPC
Remittances	≈20% of GDP	World Bank
Original forest cover remaining (primary)	A few percent	UN, FAO, BINUH (as cited)

Rounded; sources and vintages vary. Haitian statistics are weak and contested, which is itself a symptom of the loss of capacity.

The Haiti loop

The mechanism is a six-step loop (Figure 12). Extractive debt and isolation starve the state; the state cannot afford to prevent the environmental loss that follows from poverty; the environmental loss amplifies disasters; the disasters destroy the fiscal base and the government's facilities; the state's hollow security capacity is displaced by armed groups who tax, extort and control water, fuel and roads; and the loss of skilled people (doctors, teachers, engineers) and dependence on remittances further reduces the state's ability to rebuild. Each turn of the loop lowers the capacity needed to break the next turn.

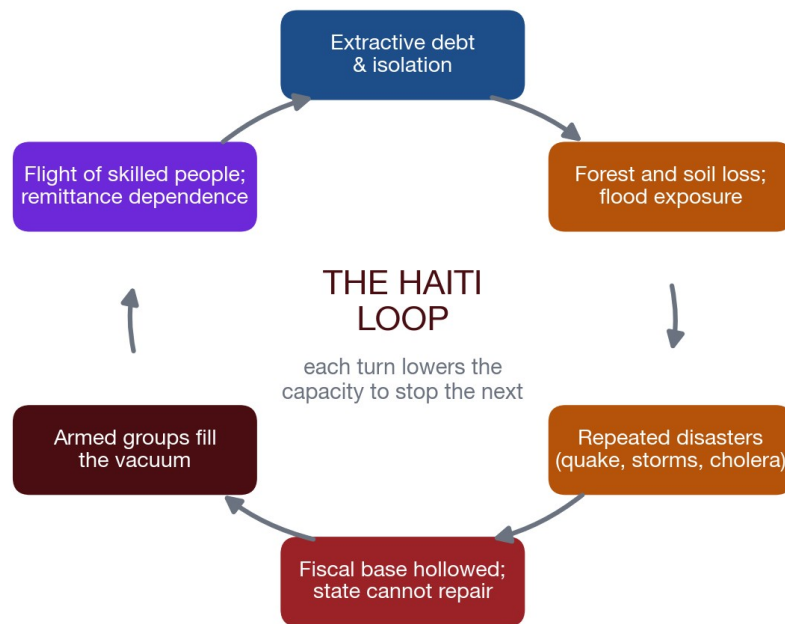


Figure 12. *The Haiti loop: a self-reinforcing sequence of capacity loss.*

Source: H Heuristics, conceptual synthesis of the historical record.

Four lessons for the planetary question

- **Collapse is capacity, not culture.** Each link in the loop can be traced to a policy or an external action. A different history — no indemnity, no occupation, no forest loss — would have produced a different state.
- **Compounding beats size.** Haiti suffered a series of individually survivable shocks. The cascade, not any one shock, did the damage — exactly the polycrisis logic.
- **The state monopoly on force is the final buffer.** When it goes, all other buffers become taxable by armed groups, and recovery requires solving security first.
- **External help cannot substitute for internal capacity.** Aid, remittances and peacekeeping have kept Haiti alive, but fragmentation and short horizons have also made the state weaker; billions have been disbursed with little improvement in institutional capacity.

10. Other Case Studies and Historical Analogues

KEY FINDINGS

- **No single analogue fits; each shows one part of the process.** The Bronze Age collapse and the fall of Rome show multi-century regressions; Somalia, Syria and Sudan show modern state failure; the Sahel shows climate–conflict coupling; Venezuela and Lebanon show fiscal-currency collapse without war.
- **Recovery is possible and slow.** Greece took about 450 years to recover literacy; Rome’s population took centuries to recover.
- **Modern failures are faster and spread faster** because populations are more urban, more dependent on imported food and fuel, and more connected through finance and migration.

No historical episode is a template for the Polycrisis Apocalypse, because none occurred in a globally integrated, fossil-powered, eight-billion-person civilisation. But several illuminate individual mechanisms, and read together they give a sense of both how far collapse can go and how it ends.

Ancient and premodern regressions

The **late-Bronze-Age collapse** (c. 1200 BCE) saw a cluster of interlinked Eastern Mediterranean states — Mycenaean Greece, the Hittites, Ugarit, New Kingdom Egypt’s Levantine empire — fail within a few decades, from some mix of drought, earthquakes, invasions and the collapse of the trade networks that tied them together ([Cline 2014](#)). Greece lost writing for about 450 years. The pattern is a *polycrisis in miniature*: multiple stressors, tight coupling across trade, and no spare capacity. The **fall of the western Roman Empire** (5th century CE) combined fiscal strain, military overextension, plague, climate cooling and migration; the physical evidence — shrinking pottery trade, falling building quality, reduced Greenland-ice lead pollution — indicates a regression in material complexity that lasted centuries ([Ward-Perkins 2005](#)). Both examples show that regressions can be real, deep and long without a single catastrophe, and that recovery is not automatic.

Modern state failure

Table 8. Modern analogues: what each shows about the polycrisis

Case	Onset	Core mechanism	Scale of harm	Lesson
Somalia	1991	State collapse after civil war; clan militias; drought	≈260,000 famine deaths (2010–12); millions displaced	Security vacuum plus drought
Syria	2011	Drought, rural migration, authoritarian response, civil war	≈500,000+ killed; >12 million displaced	Climate stress as threat multiplier
Lebanon	2019	Banking and currency collapse; port explosion	Real GDP fell ≈40% (2019–21); poverty rose sharply	Fiscal collapse without war
Venezuela	2014–	Oil dependence, hyperinflation, institutional decay	≈7.7 million emigrated	Capital and skills flight
Sahel (Mali,	2012–	Climate stress, jihadist insurgency,	Millions displaced; large	Climate–conflict–

Case	Onset	Core mechanism	Scale of harm	Lesson
Burkina Faso, Niger)		coups	areas outside state control	governance coupling
Sudan	2023–	Power struggle between armed forces; famine	>12 million displaced; largest displacement crisis	Rapid state failure in a large country
Haiti	2021–	Debt, disaster, gang control	≈1.3 million displaced; ≈90% of capital controlled by gangs	The full loop (Section 9)

Figures are approximate and drawn from UN, World Bank, UNHCR and OCHA reporting. The table is illustrative, not comparative: each case has distinct causes.

What the cases share

Four features recur. **First**, the proximate trigger is rarely the real cause; the underlying condition is a thin fiscal and administrative base that cannot absorb a shock. **Second**, the *monopoly on force* is the last buffer to fail, and its failure marks the shift from ‘fragile’ to ‘post-state’. **Third**, population movement is the way local collapse becomes regional: Syria’s displacement reshaped European politics; Sudan’s is straining Chad, South Sudan and Egypt. **Fourth**, stabilisation without capacity-building produces a durable but degraded equilibrium: Somalia has had functioning pockets for thirty years, while the underlying fiscal base remains thin. That fourth feature is what the report means by ‘stabilising at unsafe levels’.

What is different now

Three things distinguish the present from every historical analogue. The first is **scale and coupling**: for the first time, a failure of food, energy or finance in one part of the world is a price shock in every other. The second is **speed**: modern failures occur in years, and information moves faster than institutions. The third is **permanence of the environmental change**. Previous regressions took place in a climate that was broadly stable; the present one involves a climate shift that will persist for millennia, so that ‘recovery’ means recovery to a different and harsher baseline.

11. Planetary Haiti: When the Majority World Is the Exposed World

KEY FINDINGS

- **The question is not whether a population can govern itself — it is whether the capacity-to-stress ratio of the median society holds.**
- **Haiti's six preconditions are all present somewhere in the SRR belt today;** none is present everywhere. What distinguishes the planetary scenario is that they co-occur, and that the surrounding buffer of wealthy, stable regions erodes.
- **A world in which most people live in SRRs has no external buffer.** Haiti has been kept alive by remittances, aid and peacekeepers from outside. In a planetary Haiti, there is no outside.
- **The scenario is conditional, not predictive.** Each precondition has a corresponding lever; Section 14 sets them out.

H Heuristics' working hypothesis is that once African and African-descended populations come to dominate humanity — as in the Africa Ascendant scenario, around the late 2350s — the world may face the kind of utter collapse that Haiti has suffered. That hypothesis is worth testing against the evidence rather than asserting, and the test has to be careful about what actually carries the causal weight.

What would have to be true

Haiti's trajectory depends on six conditions: a fiscal base too small to maintain the state (Haiti's government revenue is only around 6–7% of GDP, among the lowest in the world); a security sector too weak to hold the monopoly on force; an ecological base degraded to the point that every hazard is amplified; external financing on adverse terms; chronic outflow of skilled people; and dependence on outside assistance. A planetary version requires these not merely to coexist in some regions but to become the *median* condition and to lose the external buffer that has so far contained them. Table 9 lists the conditions and where the world stands.

Table 9. Haiti's six preconditions and their planetary analogues

Haiti condition	Planetary analogue	Status today	What would make it planetary
Fiscal hollowing (revenue $\approx$ 6–7% of GDP)	Governments unable to fund repair and adaptation	Present locally; Africa averages $\approx$ 15–17% of GDP	Interest burdens, ageing and shrinking tax bases in rich regions as well as poor
Loss of monopoly of force	Armed groups holding territory, water, fuel	Present locally (Sahel, Sudan, Haiti)	Cheap weapons plus fiscal collapse of security forces over wide areas
Ecological base degraded	Soil, forest, water and climate stability lost	Present locally; 7 of 9 boundaries breached	Hothouse feedbacks; soil depletion over centuries
Adverse external finance	Debt service exceeding health or education spend	3.3 billion people affected	Persistently high rates; no restructuring mechanism
Skilled flight and remittance dependence	Brain drain; loss of medical and engineering capacity	Present (e.g. doctors' emigration)	Population ageing everywhere competing for the same skills

Haiti condition	Planetary analogue	Status today	What would make it planetary
Reliance on outside help	Aid, peacekeeping, import dependence	Aid fell 23% in 2025	No remaining ‘outside’: the donors are themselves stressed

Assessment is H Heuristics judgement on current evidence; ‘present locally’ means observed in some regions today; ‘planetary’ would mean the median condition.

Why composition is not the cause

The temptation is to read the planetary scenario as a statement about who will be in the majority. The evidence does not support that reading, and the reasoning needs to be explicit. **First**, the causal chain in Haiti runs through debt, occupation, extraction, ecological loss and disaster — each of which was *imposed* or *compounded* by conditions external to the population. **Second**, the societies of Africa have repeatedly built, lost and rebuilt complex states, from Aksum and Mali to modern Botswana, Mauritius, Rwanda, Ghana and Kenya, and several African states are among the world’s fastest-growing economies and leaders in clean-energy deployment. **Third**, the world’s present capacity centres — East Asia, Europe, North America — are *also* heading toward demographic contraction and fiscal strain, so the risk of capacity erosion is global, not located in one region.

What the demographic shift does is change the *balance of exposure and capacity*. A world in which the majority is young, growing and sitting in a high-stress belt will either convert its demographic dividend into capacity — power, schooling, jobs, governance — or it will not. If it does, the planet’s median condition improves. If it does not, the weight of exposure shifts onto a population too large for any external actor to rescue. The risk is not composition; it is **arithmetic combined with institutional lag**. This is why Section 14 puts so much weight on the build window of 2025–2040: the capacity must be put in place while the cohort is still young and the ageing regions still have surplus.

Three routes to a planetary Haiti

- **Route 1: capacity lag.** The SRR belt grows faster than its buffers. Heat, debt and conflict compound as in Haiti, state after state. Population growth turns from dividend to burden. The mechanism is internal to the belt.
- **Route 2: patron withdrawal.** Ageing, fiscally strained and politically polarised wealthy regions cut aid, technology transfer and market access; the external buffer that has contained fragility disappears.
- **Route 3: shock synchronisation.** A discontinuity (large-scale war, a pandemic, a financial crisis or a food-system shock) strikes during the Danger Window, when buffers are thinnest everywhere, and the cascade spreads from the SRR belt into the previously buffered regions.

These routes are not exclusive; the weak path of this report combines all three. They also point to different levers. Route 1 is addressed by investment in capacity (Section 14); Route 2 by reforming how the wealthy world finances global public goods; and Route 3 by reducing tail risks (arms control, pandemic preparedness, financial-system resilience). None is hopeless, and none is costless.

12. The Long Tail: Centuries, Millennia and Extinction

KEY FINDINGS

- **Earth-system recovery times dwarf human political time:** warming persists ~10,000 years; Greenland re-glaciation ~50,000 years; topsoil regeneration ~1,500 years.
- **Three long-run pathways diverge after the 2080s peak:** buffered convergence (≈ 7.0 bn in 3000 CE), unsafe stabilisation (≈ 3.0 bn) and endgame (≈ 1.4 bn, then extinction in 30,000–50,000 years).
- **The exposure integral reveals a counter-intuitive result:** cumulative SRR exposure to 12,000 CE is about 3.0 trillion person-years on S1, **21.3 on S2** and 7.1 on S3. A world that stabilises at unsafe levels accumulates the most suffering; extinction, awful as it is, caps the total.
- **By 3000 CE, S2 has already exceeded all human life lived to date** (≈ 3.9 trillion person-years).

A report about the Polycrisis Apocalypse has to take its time horizon seriously, because the defining feature of the scenario is duration. The most severe outcome in the literature is not a sudden end; it is a long condition in which the planet is warmer, more toxic and less productive, and a smaller human population persists at a lower level of capability for a very long time. The companion preprint on the *exposure integral* ([Figshare](#)) argues that the right metric for such a world is not a headcount at a date but the **sum of person-years lived in unsafe conditions**.

Why the tail is long

Several of the planet's slowest processes set the timescale. The carbon dioxide emitted now stays in the atmosphere-ocean system for tens of thousands of years, with a significant part of its warming and sea-level effect committed for about ten millennia ([Clark et al. 2016](#)). Ice sheets respond over centuries to millennia. Topsoil, once lost, regenerates over roughly fifteen centuries. Fossil fuels are the key: the concentrated, cheap energy that powered industrialisation was a one-time endowment of the past two centuries; the [Endgame essay](#) argues that its exhaustion forecloses re-industrialisation after a regression. Even if one doubts the strong form of that claim (the energy-return arithmetic is debated), the weaker form is hard to dismiss: rebuilding a complex society from a lower resource base takes much longer than building the first one did.

Three long-run pathways

S1 (buffered convergence) has population drifting down gently to about 7.0 billion by 3000 CE and about 5.0 billion at the 50,000-year horizon, with the SRR share falling toward 4%. S2 (unsafe stabilisation) sees population fall to 3.0 billion by 3000 and about 1.9 billion by 12,000 CE, with about 85% of those people in SRRs. S3 (endgame) follows the pessimistic arc of the [Endgame essay](#): peak at 10.3 billion in the 2080s, a fall to 6.5 billion by 2200, 3.5 billion by 2300 and about 1.4 billion by 3000 CE, then a long attrition to extinction within 30,000–50,000 years. The year-3000 end-state in S3 — a hot, degraded planet in which most survivors are of African descent, life expectancy is perhaps 28 years and a majority of children are stunted — is the scenario the Endgame essay draws in detail; it is a thought experiment, not a forecast.

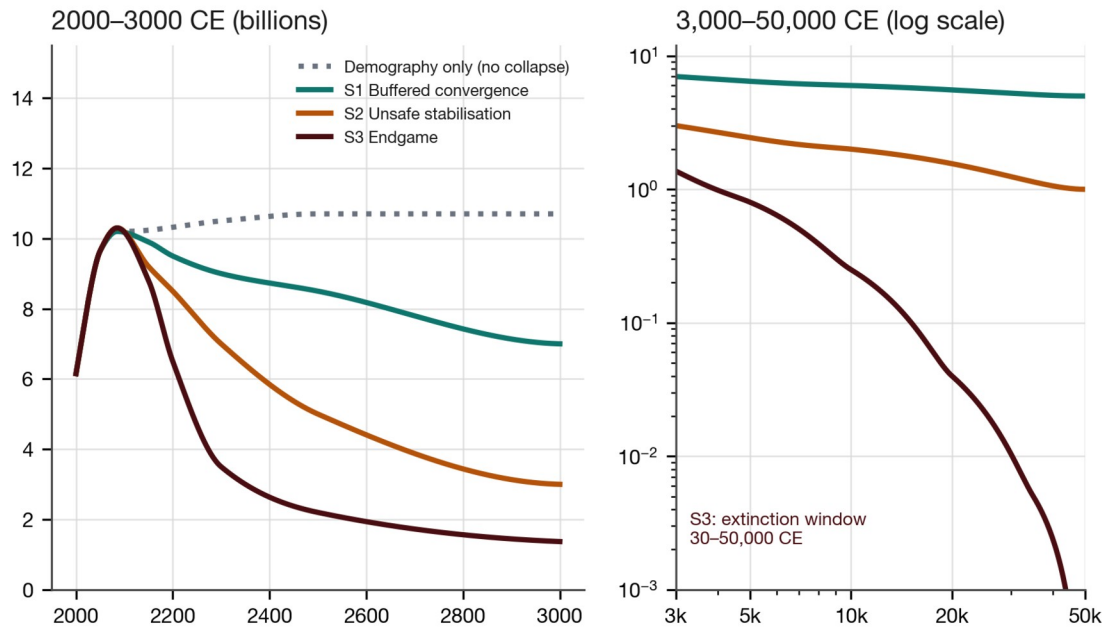


Figure 13. Population pathways, 2000–3000 CE (left) and 3,000–50,000 CE on a log scale (right).

Source: H Heuristics scenario model; UN WPP 2024 to 2100; Africa Ascendant reference line (S0); Endgame essay for S3 end-state.

The exposure integral

Population counts hide a fact about suffering: duration matters as much as headcount. Figure 14 integrates the number of people in SRRs over time. On S3 the integral flattens, because the population falls toward zero. On S2 it keeps climbing, because a population of one to three billion persists in unsafe conditions for tens of thousands of years. By 3000 CE, S2 has accumulated 4.3 trillion person-years of SRR exposure, S3 2.7 and S1 0.7 — against about 3.9 trillion person-years lived by all humans who have ever existed (roughly 117 billion people, [PRB](#), at a ~33-year average life). By 12,000 CE the figures are 21.3, 7.1 and 3.0 trillion.

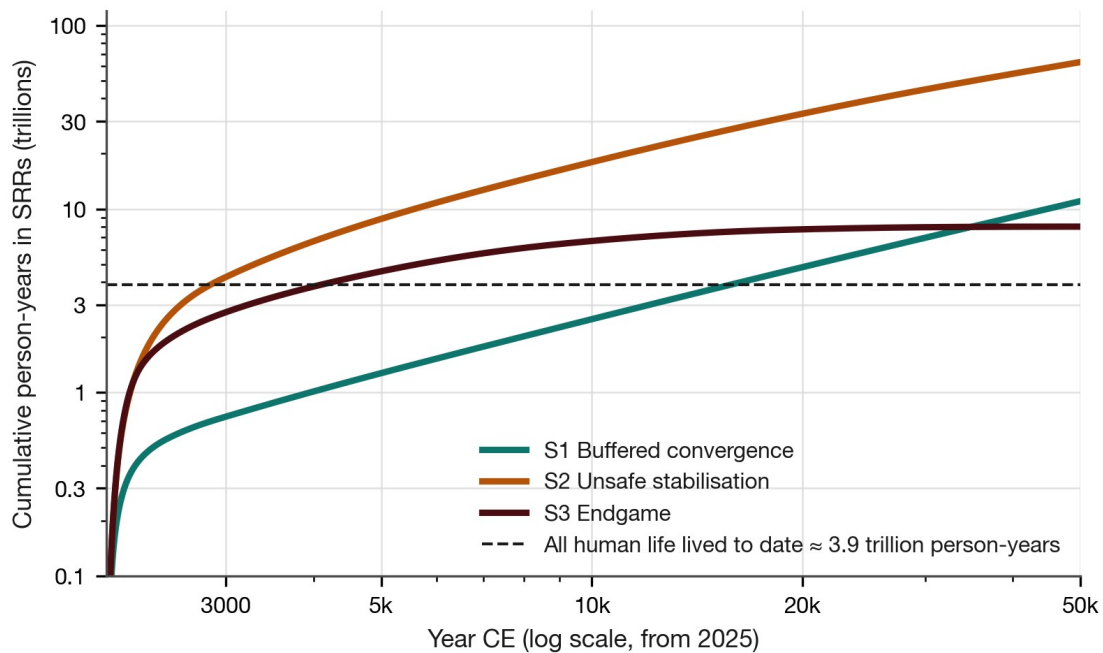


Figure 14. Cumulative person-years lived in Survivability Risk Regions, 2025–50,000 CE (log scales).

Source: H Heuristics scenario model. Reference line: ≈ 117 billion people ever born (PRB) $\times \approx 33$ years mean lifespan.

The reading is sobering in two ways. First, **the most severe outcome by this metric is not extinction but a prolonged unsafe stabilisation.** A world that settles into a low-capacity equilibrium with a billion or two people in chronic hardship can accumulate more person-years of suffering than one that goes extinct, because it lasts longer. That is the strongest form of the argument that the polycrisis should be avoided as a *process* rather than merely as an end-state. Second, even the buffered pathway accumulates a non-trivial exposure integral, because some regions remain stressed for millennia; the objective is not zero but a much lower, and eventually vanishing, tail.

A note on the extinction window

The S3 pathway ends in extinction over 30,000–50,000 years, a figure borrowed from the Endgame essay and consistent with the order of magnitude of the slowest Earth-system recovery times. It should be treated as a conceptual end-state. Species with small, fragmented populations and no industrial base face real extinction risks over such horizons; whether humans would is uncertain, and the scenario is explicitly the most pessimistic in the set. Its role in the analysis is to bound the tail and to show that even the worst case is, in the first few centuries, indistinguishable from the other two: the paths diverge after 2100, which is why the decisions of the next few decades carry the weight.

13. Scenarios, Triggers and Early-Warning Indicators

KEY FINDINGS

- **The pathways diverge in the 2040s and 2050s**, but the signals that distinguish them appear earlier and can be tracked.
- **Fourteen indicators** across the six drivers give a dashboard; five are ‘lock-in’ markers whose passing makes the weak path more likely.
- **The most useful early-warning variables are capacity variables**, not hazard variables: revenue per head, debt service ratios, grid reliability, security-force coverage and skilled-worker retention.

The scenarios of this report are not predictions; they are branches. What a decision-maker needs is a way of seeing which branch the world is on while there is still time to move. The indicators below are drawn from existing public series, so each can be tracked without special data.

Table 10. Early-warning dashboard

Driver	Indicator	Source	Warning sign
Climate / heat	Days per year with WBGT above 30.5°C in tropical cities	National met services; ERA5	Rising faster than the +2°C path
Climate / heat	Global mean temperature and Earth’s energy imbalance	NASA, Copernicus	Imbalance continuing to rise
Pollution	Population above WHO PM _{2.5} guideline; clean-cooking access	WHO; IEA	Clean-cooking access stagnates
Pollution	Children with elevated blood lead	UNICEF / Pure Earth	No decline in the lead burden
Poverty / debt	Countries in or at high risk of debt distress (low-income)	IMF–World Bank DSA	More than half
Poverty / debt	Interest costs as share of revenue in SRR-belt states	IMF; UNCTAD	Rising above 25–30%
Capacity	Government revenue per head and as share of GDP	OECD; World Bank	No convergence in the SRR belt
Capacity	Grid reliability: outage hours during heatwaves	Utilities; IEA	Multi-day regional blackouts
Conflict	State-based conflicts; forcibly displaced	UCDP; UNHCR	New highs each year
Weapons	Nuclear warhead counts; arms-control treaties in force	FAS; SIPRI	Last bilateral limits lapse
Demography	Dependency ratios and the working-age share	UN WPP	Rising in the wealthy regions without reform
Demography	Fertility and youth employment in the SRR belt	UN WPP; ILO	Youth unemployment above 25%
Finance	Aid and concessional finance flows	OECD DAC	Further declines after the 23% fall in 2025

Driver	Indicator	Source	Warning sign
Energy / soil	Share of new capacity that is clean; topsoil loss	IEA; FAO	Clean share stalls below 70% of additions

Thresholds are H Heuristics judgement, intended as prompts for review rather than precise tipping points.

Five lock-in markers

- **The grid test:** a multi-day heat-driven blackout covering a city of more than ten million people.
- **The security test:** a second capital city in which armed groups hold the majority of territory.
- **The debt test:** more than half of low-income countries in or near debt distress with no restructuring framework.
- **The cooling test:** a heatwave in which indoor temperatures cause mass mortality among those without cooling.
- **The aid test:** official development assistance falling below 0.2% of donor GNI, at which point adaptation finance becomes a rounding error.

None of these markers is a prophecy; each is a signal that the weak path's assumptions are being met and that the Danger Window will find the system with less margin than the buffered path assumes.

14. Off-Ramps: What Changes the Path

KEY FINDINGS

- **Every tier has a matching lever**, and most are cheaper now than they will be after 2040.
- **The most important levers are capacity levers**: clean power and cooling, fiscal reform and debt relief, security and governance, and the preservation of knowledge.
- **Examples exist in the SRR belt itself**: Morocco's solar build-out, Kenya's geothermal-led grid and Ethiopia's hydropower show that deployment at scale does not require wealth first.

The weak path is a scenario, not a sentence. The same arithmetic that makes it frightening makes the alternative visible: every tier has a lever that works, and the cost of using it rises sharply with time. The Zenodo companion ([Hughes 2026d](#)) frames the response as decentralised resilience, regenerative food systems, distributed energy, water security, fiscal reform and preservation of scientific knowledge. This section orders those into a programme.

Table 11. Levers by tier and driver

Target	Lever	Evidence / example	Window
Tier A	Clean cooking; clean grid; particulate controls	Household air pollution causes ≈ 3 million deaths a year; clean cooking is among the cheapest health interventions available	2025–2040
Tier B	WBGT labour protocols; passive cooling; school rescheduling	Cheap, deployable by cities and employers within years	2025–2035
Tier C	Grid hardening; storage; distributed solar and microgrids; water-system redundancy	Distributed solar and storage deployment rates in Pakistan, Africa and India	2025–2045
Tier D	Hold warming near 2°C; cooling refuges in hotspot cities	Fork: 2.4 bn vs <0.1 bn exposure	Mitigation now
Poverty / debt	Debt restructuring; concessional finance; green and sustainable bonds	Green bonds and sustainable finance ; Climate Bonds Initiative	2025–2035
Capacity	Revenue mobilisation; civil-service and security-sector reform; digital public infrastructure	Revenue-to-GDP convergence in the SRR belt	Ongoing
Conflict / weapons	Arms control; non-proliferation; pandemic preparedness; grid cyber-defence	Treaty frameworks; SIPRI	Now
Knowledge	Preserve archives, universities, medical and engineering knowledge in robust forms	Redundant digital and physical repositories	Now

'Window' is the period in which the lever is cheapest or most effective.

Energy first: the case for distributed clean power

The single most leveraged intervention in the SRR belt is cheap, reliable, clean electricity, because it addresses Tier A (clean cooking and industrial pollution), Tier B (cooling and productivity), Tier C (grid

reliability) and the fiscal load (displacing imported fuels) at the same time. The evidence from the belt is encouraging. Morocco has built one of the world's largest solar complexes at Ouarzazate and set a target of about 52% renewable capacity by 2030 ([MASEN](#); see the Morocco discussion in [Hughes 2026c](#)). Kenya generates about 90% of its electricity from renewable sources, led by geothermal ([IEA](#)). Ethiopia's grid is almost entirely hydropower. The falling cost of solar panels and batteries is making distributed systems competitive even where central grids do not exist.

Finance: closing the capacity gap

Capacity requires finance, and the present structure of finance runs the wrong way: debt-service burdens in low-income countries now exceed health or education spending for 3.3 billion people, and adaptation finance falls well short of the need ([UNEP Adaptation Gap Report](#)). The responses include debt restructuring on faster timelines, expanded concessional lending, use of green and sustainable bonds for adaptation and clean energy ([H Heuristics on green bonds and sustainable finance](#)), and the alignment of central-bank supervision with climate risk ([NGFS](#)). The ageing wealthy world has an interest in this: a stable, growing, middle-income Africa and South Asia are the largest potential markets and the largest potential sources of workers and innovation of the 21st century.

Security and governance

The Haiti loop breaks at the security link: without the monopoly on force, nothing else can be rebuilt. Conversely, countries that maintain basic security through the Danger Window can absorb a great deal. The levers are unglamorous — police and justice reform, border management, control of small arms, and credible, locally owned peace processes — and they should be funded before the cascade rather than after it. At the global level, the priority is to prevent the discontinuities: nuclear arms control, bio-risk governance and cyber-resilience of the grid and financial system.

Preserving the means to rebuild

The scenario's worst outcome — a world that cannot re-industrialise — depends on the loss of knowledge as much as of energy. The cheapest insurance against the long tail is to preserve what would be needed to rebuild: robust, distributed archives of scientific, medical and engineering knowledge; seed banks and soil-restoration practice; and the training of the skilled people who can use them. This is the lever with the smallest cost and the longest payoff, and it is the one most easily neglected.

15. Conclusion

The question is not whether humanity can survive a catastrophe. It is whether most of humanity will end up living, for a very long time, in places where survival is a daily negotiation — and whether we will have chosen that outcome by not choosing at all.

This report has argued that the Polycrisis Apocalypse is best understood as a process: interacting crises that accumulate faster than civilisation can repair them, eroding the capacity to repair, and producing a long regression rather than a sudden end. It has argued that the process has a geography — a belt of heat, pollution, debt and fragile states that runs through Sub-Saharan Africa, the Sahel, the Arabian Peninsula and South Asia — and that this belt holds a rising share of humanity. It has argued that on a weak path a majority of humanity is in a Survivability Risk Region by about 2050; that the median human's circumstance becomes, over the following centuries, that of an African living in an SRR; and that the cumulative exposure of such a world, measured in person-years, could exceed everything humanity has lived to date within a thousand years.

It has also argued, with equal weight, that this is not a natural fact about any people. Haiti's collapse is the product of a sequence that can be named and, in principle, broken. The demographic shift is the product of fertility differences that are themselves the product of development. The capacity to turn a young, growing population into a source of power and innovation is available, as the examples of Morocco, Kenya and Rwanda show in different ways. The scenario is pessimistic by design, so that the mechanics are visible and the choices clear.

Five conclusions

- **Treat survivability as a process.** Act on Tiers A and B now; do not wait for headline thresholds.
- **Measure capacity, not just hazard.** The ratio of stress to repair decides whether a region becomes an SRR.
- **Use the 2025–2040 build window.** Clean power, cooling, grid hardening, debt relief and capacity-building are cheaper before the Danger Window than during it.
- **Break the loop at its security and fiscal links.** Haiti shows that when the monopoly on force and the fiscal base go, nothing else can be rebuilt.
- **Preserve the means to rebuild.** The cheapest insurance against the long tail is knowledge, seed, soil and skill.

The long tail, if it comes, will not be written by a single decision. It will be written by thousands, most of them in the next twenty years, most of them small. The purpose of this report is to make those decisions legible. The weak path is a real possibility; the buffered path is a real possibility too; and the gap between them, measured in the lives of billions of people, is the largest the world has ever faced.

Appendix A. Model Parameters and Method

All scenario outputs in this report come from a transparent, replicable model. Its structure is: (1) population by region from the UN WPP 2024 medium variant for 2025, 2050 and 2100 (rounded and regrouped into eight regions); (2) a share of each region's population assumed to live in an SRR on three paths (2025, 2050/2100 weak, 2050/2100 buffered); (3) beyond 2100, three population pathways (S1–S3) and SRR-share pathways interpolated monotonically through anchor points; (4) a cumulative sum of people in SRRs over years from 2025 to 50,000 CE. Africa's share of humanity after 2100 follows the Africa Ascendant scenario.

Table A1. Regional SRR shares (percent of regional population)

Region	2025	2050 weak	2100 weak	2050 buffered	2100 buffered
Sub-Saharan Africa	72	82	90	62	40
North Africa & West Asia	35	55	75	30	15
South Asia	55	70	82	45	22
South-East Asia & Melanesia	25	40	58	20	8
East Asia	12	20	30	8	3
Latin America & Caribbean	25	38	55	18	8
Europe & Central Asia	5	8	15	3	1
North America & Oceania	3	6	12	2	1

Judgemental parameters calibrated so that the 2025 total (35%) sits between the ≈ 2 bn in fragile settings and the 3.3–3.6 bn in highly climate-vulnerable contexts.

Table A2. Long-run pathways (billions of people)

Year	S0 demography	S1 buffered	S2 unsafe	S3 endgame
2025	8.2	8.2	8.2	8.20
2050	9.7	9.7	9.7	9.65
2100	10.2	10.2	10.2	10.18
2200	10.3	9.5	8.5	6.50
2300	10.5	9.0	7.0	3.50
2500	10.7	8.5	5.0	2.20
3000	10.7	7.0	3.0	1.37
12,000	10.7	5.9	1.9	0.18
50,000	10.7	5.0	1.0	≈ 0

S0 shown for reference. Values interpolated between anchors with a shape-preserving cubic.

Table A3. Share of people in SRRs and cumulative exposure

Year	SRR share S1 / S2 / S3	Cum. exposure S1	Cum. exposure S2	Cum. exposure S3
2100	22% / 69% / 72%	0.2	0.4	0.4

Year	SRR share S1 / S2 / S3	Cum. exposure S1	Cum. exposure S2	Cum. exposure S3
2300	8% / 80% / 88%	0.5	1.7	1.5
3000	4% / 85% / 90%	0.7	4.3	2.7
12,000	4% / 85% / 90%	3.0	21.3	7.1
50,000	– / – / –	11.0	63.2	8.0

Cumulative: trillions of person-years in SRRs from 2025; reference ≈ 3.9 trillion person-years of life lived to date.

Sensitivity

Three assumptions carry most of the weight. The first is the SRR share of the largest regions (Sub-Saharan Africa and South Asia); lowering both by 10 percentage points in 2100 lowers the weak-path SRR total by about 0.6 billion, and moves the majority crossing from about 2050 to the early 2060s. The second is long-run fertility, to which the Africa Ascendant numbers are acutely sensitive: a change of a few hundredths of a child per woman changes Africa's 2500 population by billions. The third is the long-run shape of the S2 pathway: the exposure-integral conclusion (that unsafe stabilisation exceeds extinction) holds as long as the surviving population exceeds about a quarter of a billion for more than a few thousand years in a high-exposure state. None of the report's qualitative conclusions depends on a particular value; the quantitative ones are illustrations.

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