Adapting to overshoot realities

in the context of development

Chapter 4 · Limiting Overshoot: Navigating exceedance of 1.5°C and pathways towards return

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THE PROBLEM

What overshoot changes — and what it does not

A harder problem, not a new one

The need for cross-sectoral, systemic and flexible adaptation was already well established. Exceedance of 1.5°C does not create that need. It fundamentally complicates it.

1.5°C was never a safe harbour

1.5°C is not considered safe for most nations, communities, ecosystems or sectors. Large adaptation needs remain even if mitigation eventually returns warming to it.

There is no single adaptation number

Adaptation is context-specific and heterogeneous, and happens at local and regional scales — not the global scale at which mitigation and physical trends are summarised. It cannot be reduced to one curve or aggregate.

Returning to 1.5°C will not automatically undo the impacts sustained on the way there. Many are irreversible, and they fall hardest on those least responsible and least resourced.

Chapter 4, §4.1 and §4.3

The starting position

- Adaptation on the ground falls far short in scale, in depth and in reach — most of all for those most vulnerable, who contributed least to the warming they must live with.
- The shortfall is most acute in resource-constrained regions, but increasingly present in wealthier contexts too.
- Planning and implementation remain poorly aligned. Planned adaptation does not reliably translate into action.
- Where adaptation is implemented, it rarely results in transformation. It is applied in short-term, sector-specific, incremental ways.

Two challenges now converge for planners: deep uncertainty about the timing and level of peak warming, with warming already exceeding 0.25°C per decade — and multiple adaptation limits likely to be breached.

MALADAPTATION AND MISMATCH

Designed for global warming that ends at 1.5°C

Adaptation is not only spotty, fragmented and under-resourced. Its design basis is wrong for the problem. Standards, plans and investments are built on historical records, on present conditions, or on a single future stabilisation level — and where they do look past 1.5°C, they still assume change that is gradual, continuous and in one direction. Almost none of it is designed for a trajectory that rises, peaks and then falls.

And the design entrenches what it should undo

Adaptation built inside existing institutional frameworks and power structures can fail to address — and may actively entrench — the root causes of vulnerability, feeding back across sectors, regions and timeframes.

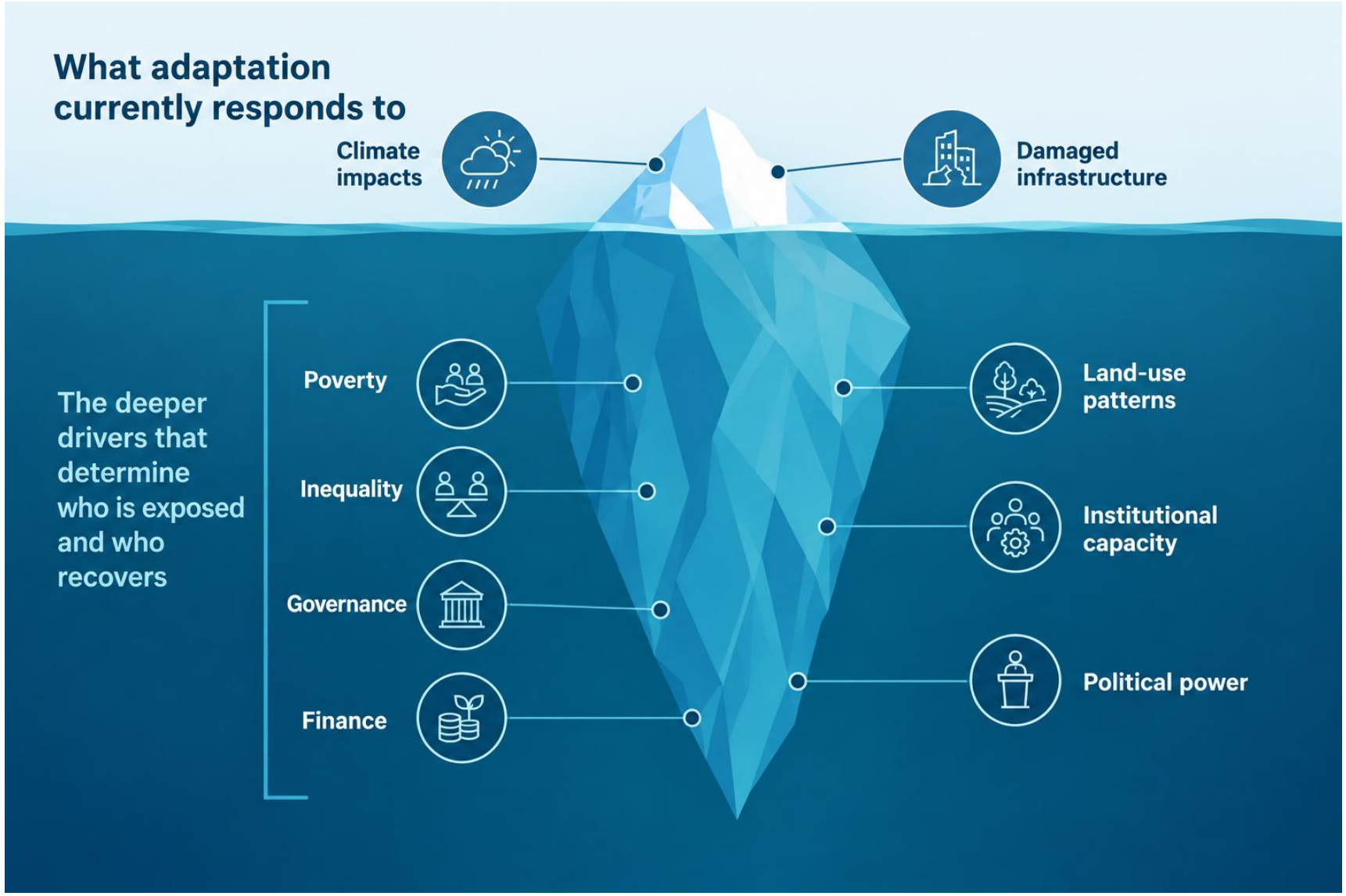
What that looks like

Hard coastal defences protect high-value assets while shifting risk onto lower-income communities and foreclosing longer-term options such as managed retreat — deepening the drivers of exposure rather than easing them.

Window of Opportunity: Adaptation plans are not yet fully locked in. They can still be recalibrated before implementation sets them in place — which is why the sequencing decisions taken now matter more than the ambition expressed in them.

Chapter 4, §4.2 and §4.3

Practical responses are necessary — but not sufficient



RESTORATION PLEDGES — MALADAPTATION AT SCALE

When the response becomes the risk

The carbon deficit

Against the Bonn Challenge goal of 350 million hectares by 2030, analysis of the commitments found 45 per cent going to monoculture plantations, 34 per cent to natural forest regeneration, 21 per cent to agroforestry. Given entirely to natural forest, the goal would store around 42 billion tonnes of carbon by 2100 — about 16 billion under the current mix, and 1 billion as plantation alone.

What it does to communities

Plantations draw far more water than the vegetation they replace, cutting streamflow and lowering water tables downstream. Land classified as unused or degraded is often pastoral land in active use, so afforestation ***constrains livelihoods and the capacity to adapt***. Promised jobs and forest products are overstated or slow to arrive, while the losses land immediately. Pine and eucalyptus are highly flammable, raising fire risk in the settlements they enclose.

Afforestation in the wrong locations: Savannas and grasslands are not degraded forest — and they have a natural fire regime. They are not only African — covering about a fifth of the world's land, from the Cerrado to India, Madagascar and northern Australia. Most of their carbon sits below ground, in roots and soils, where it survives the fire and drought that destroy standing biomass. Planting trees there darkens the surface: once albedo is counted, carbon-only estimates of the climate benefit are 20 to 81 per cent too high, with the largest reductions in the savannas of Africa and central Asia. Planted on the wrong biome, a carbon project can raise emissions risk rather than lower it.

These targets are written in hectares of "forest" — a category that includes plantations, and that treats savanna as forest awaiting trees.

Chapter 4, §4.3 · Lewis et al., Nature · Parr et al. 2024, Science · albedo analysis, Nature Communications 2024 · FAO Global Forest Resources Assessment definitions

THE STAGE WE ARE ENTERING — NOT THE ONE AFTER IT

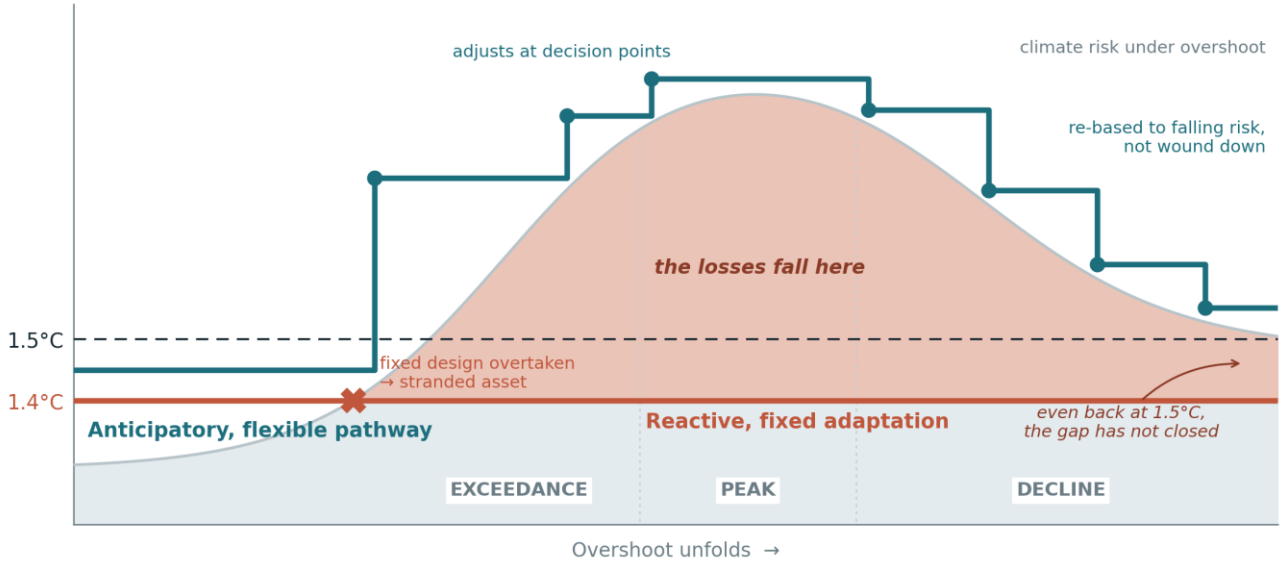
Exceedance stage is where this is decided

- Exceedance stage is the first serious test of the adaptive capacity built under current conditions. Capacity that takes a decade to build cannot be improvised in the year it is needed — and by then the institutions and budgets that would build it are absorbed by responding.
- Anticipatory humanitarian action, pre-positioned emergency supply chains, heat action plans, early warning systems and scalable social protection must already be operational — not established in response to the stage.
- Intensification will not be uniform because regions behave differently as warming continues. In some regions, tipping point dynamics introduce abrupt shifts alongside gradual change.
- Cascading and compounding events become more frequent, straining systems across sectors simultaneously.
- Active monitoring and learning are critical and must already be tracking the approach of critical thresholds that may be crossed at or near peak. Without this, vulnerabilities already emerging intensify further.

Adaptation is not a plan that gets completed. Each stage inherits the legacies of the one before — strategies must function under worsening conditions, withstand a potentially prolonged peak, and remain relevant as conditions change in more than one direction. Investment calibrated to any single stage will likely be poorly matched to the next — learning and re-baselining is continuous, not one-off events.

THE DESIGN CONSEQUENCE

Reactive adaptation is itself a stranded asset



A mitigation asset underwater is a stranded asset

The solar farm, the grid upgrade, the electrified transit line — much low-carbon infrastructure sits in exactly the same flood, heat and storm zones as everything else.

Unadapted, the very capital deployed to cut emissions is itself increasingly at risk.

Because adaptation takes years to decades to deliver benefits, anticipatory investment and implementation must begin now. Fixed for one warming level, reactive adaptation is overtaken as overshoot unfolds.

Reactive adaptation is the most expensive way to adapt. In 2024, natural disasters caused US$368 billion in economic losses worldwide — 60 per cent of it uninsured. That US$223 billion landed on households, businesses and governments. This is not a one-off; expect it to recur, and to grow.

Chapter 4, §4.3 · Haasnoot et al., adaptive pathways · Aon, Climate and Catastrophe Insight 2025

At peak stage, the demands converge

- Governance frameworks and financing must **already be operational** for managed relocation from areas crossing habitability thresholds — lethal humid heat, coastal inundation, collapse of subsistence systems.
- Monitoring must function as an active decision-trigger, with **pre-agreed protocols** keyed to ice sheet mass balance, ecosystem regime shifts, freshwater lens salinity and humid heat approaching survival limits.
- Demand on disaster response, social protection, health services and repair peaks simultaneously — precisely when budgets are most constrained by accumulated climate costs.

Risks at peak

- Extreme conditions persistent or overlapping, reducing the window for repair — partial, fragile or absent recovery.
- Design standards systematically invalid; infrastructure operating beyond its envelope.
- Rapid cross-sector cascading failure — energy, water, ICT, health — from compound extremes.

Operating principles

- Safety over performance — prevent cascading failure even where service quality declines.
- Active triage — decide explicitly what is protected, what may degrade, what must be lost. Avoid abandonment by neglect.
- Operate for endurance, not recovery — ensure a minimum viable service for all.
- Legitimate emergency governance with safeguards — unequal impacts erode public trust; transparency and documentation provide accountability to communities for prioritisation decisions taken at speed.

Chapter 4, §4.3 and Table 4.1 — exceedance and decline stages set out in full in the report

THE DECLINE STAGE

Cooling is not rewind — and it is still far better than the alternative

What decline still demands

The challenges before the peak are not the challenges after it. Cooling is slower and partial; regional conditions change rather than simply reverse. Continued sea-level rise, extinctions, regime shifts and displacement do not reverse with temperature. Communities weakened by decades of crisis face continued transition with less capacity, and re-baselining runs continuously.

Why not declining costs far more

This report's own finding: lower peak warming and shorter exceedance reduce risks and impacts, and make helping communities cope less difficult and less expensive. Returning to or below 1.5°C gives lower risks than stabilising permanently above it. Modelling shows GDP losses stabilising under minimal overshoot, while under deeper overshoot the gap is still open at 2100.

A return pathway does not give back what has already been lost. What it does is ease the losses compounding — in lives, in assets pushed beyond repair, and in the fiscal capacity consumed by response. The duration and severity of every stage depends on how quickly emissions fall.

Chapter 4, §4.3 · Reisinger et al. 2025 · Bauer et al. 2023, Environ. Res. Lett.

THE INTERDEPENDENCE

Adaptation is a precondition for mitigation

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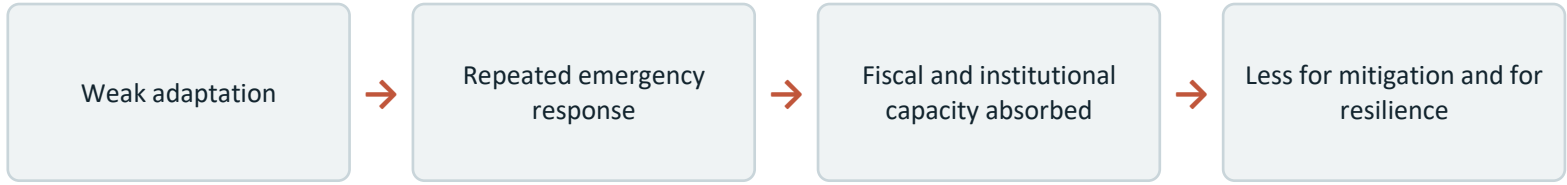
Every dollar invested in climate-resilient infrastructure in low- and middle-income countries returns about four dollars in avoided losses.

56.7%

of Jamaica's GDP — total damage and losses from a single hurricane, October 2025. Pre-arranged disaster financing available: US$1.08 billion, against US$12.2 billion in damage.

- It is commonly asserted that mitigation supports adaptation. The reverse holds equally: insufficient adaptation constrains mitigation ambition, because reactive disaster response absorbs the fiscal and institutional capacity that both require.
- Without investment, intensifying impacts compel governments to prioritise disaster response over forward-looking action — a self-reinforcing loop that can prolong exceedance itself.
- Already visible in small island developing states, where constant diversion to repeated disaster recovery limits long-term adaptation and development, despite minimal contribution to emissions.
- Preventive adaptation is more cost-effective than reactive crisis response — and by reducing disruption it also sustains the political and social support that mitigation depends on.

The sequence begins with adaptation, not with mitigation



— and the higher exposure that follows feeds straight back into the first box.

Chapter 4, §4.3 · Hallegatte, Rentschler and Rozenberg 2019; IMF · Planning Institute of Jamaica, March 2026; World Bank/IDB GRADE 2025

THE CONSTRAINT UPSTREAM OF EVERYTHING

No observations, no projections, no defensible plan

~200

long-term temperature stations across all of Africa

~5,000

rainfall stations in the United States alone

- Robust adaptation planning depends on climate projections. Projections depend on long-term observational records. For many of the most vulnerable and least-resourced nations, those records are too sparsely available to support projection at any usable resolution.
- For small island developing states the scarcity is acute — microclimates and high internal diversity demand a resolution the observational base cannot currently support.
- Where observations are genuinely absent, systematic collection is the precondition for a baseline, and therefore for any credible adaptation plan.

In many countries the records do exist. What keeps them from the modelling groups that need them is national data-sharing policy, access cost and limited dissemination. That part of the constraint is not a funding gap and not a technology gap — and it sits within the reach of governments represented in this room.

Chapter 4, §4.3

WHAT THIS ASKS

Adaptation is not optional. It is essential.

- **Forward-thinking, flexible and evolving** adaptation is a prerequisite for the sustained mitigation that overshoot demands.
- Without adaptive governance and pre-committed financing, both mitigation and long-term adaptation risk being deprioritised in favour of immediate crisis response — a feedback dynamic in which the absence of adaptation **extends the duration and magnitude of overshoot itself**.
- Distributional dimensions belong inside adaptation and mitigation planning — not appended as equity considerations after the primary technical response.
- **Political will —with the multilateralism and governance that carry it will become either the foundational enabling condition OR the critical constraint**. Demands on these will intensify across every stage, while the conditions for sustaining them may deteriorate — and may lead to international cooperation becoming least reliable when it will be most needed.
- But most of the limits binding adaptation today are soft. They bind on finance, governance and capacity — not on physics. Soft limits are bottlenecks, and bottlenecks can be widened. That part is squarely in this room's hands.

Adapt now to manage unavoidable change. Mitigate now to avoid unmanageable change. The mechanisms that close the gap — pre-committed finance, durable solidarity, inclusive governance — must be built before peak warming, not improvised under crisis.

Chapter 4, §4.5

What we choose to protect now

is what the future will be allowed to keep.