

— WHITE PAPER

MAY 2026 · APPLIED RESEARCH SERIES

Cat Bonds for Africa

Harnessing Capital Markets as a Lever
for Climate Resilience in African States

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About This White Paper

This white paper has been prepared by GSF Global Advisors as part of its applied-research work on innovative development finance in Africa. It aims to inform the debate on harnessing the capital markets as a lever for climate resilience for African States, and to put forward concrete recommendations for public decision-makers, institutional investors and development partners.

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The authors thank the contributors for their comments and critical review, which have helped enrich and strengthen the analytical quality of this document. The views expressed in this white paper are those of its authors and do not necessarily reflect the positions of the institutions to which they are affiliated.

Foreword

Africa today stands at a crossroads in the face of climate emergency. While the continent contributes the least to global greenhouse-gas emissions, it bears their consequences disproportionately. Over the past two decades, the intensification of natural disasters — floods, droughts and cyclones — has shifted from isolated events to a genuine systemic risk that threatens the development trajectory of our nations.

The diagnosis set out in this white paper is unambiguous: our existing financing mechanisms are inadequate. With insurance penetration capped at 2 – 3% of GDP and international aid that is often too slow to mobilise, Africa faces a chasmic protection gap. Every major disaster forces our States into painful budgetary trade-offs or additional borrowing, holding back essential investment in health, education and infrastructure.

Faced with this structural vulnerability, financial innovation is no longer an option but a strategic necessity. Catastrophe bonds (Cat Bonds) offer a transformative solution. By transferring risk to the global capital markets, they make it possible to mobilize immediate, predictable liquidity as soon as a disaster strikes, without weighing on sovereign debt.

This document analyses the lessons drawn from pioneering experiences in Asia and Latin America to propose a roadmap tailored to African realities. It explores how, by strengthening our institutional frameworks and harnessing the power of climate data, we can build a sovereign resilience ecosystem.

The ambition of this white paper is to mobilise a coalition of public and private actors so that Africa is no longer merely a victim of climate hazards, but a major and innovative actor in its own financial security.

Abbreviations

AAL	Average Annual Loss
ACBF	African Capacity Building Foundation
AIO	African Insurance Organisation (Organisation des Assurances Africaines)
Cat Bonds	Catastrophe Bonds
CAT DDO	Catastrophe Deferred Drawdown Option
CERF	United Nations Central Emergency Response Fund
ECB	European Central Bank
EM-DAT	International Disaster Database
EP Curve	Exceedance Probability Curve
GDP	Gross Domestic Product
ILS	Insurance-Linked Securities
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
PML	Probable Maximum Loss
SPV	Special Purpose Vehicle
USD	United States Dollar
WMO	World Meteorological Organization

Executive Summary

The past two decades have been marked by an acceleration in the frequency and severity of natural disasters across the African continent. According to EM-DAT and Swiss Re (2025), economic losses linked to extreme climate events now exceed USD 2 billion per year, of which less than 15% are insured. This structural mismatch — the protection gap — reflects the inability of traditional risk-financing mechanisms to deliver an effective and rapid response.

Conventional instruments, such as public insurance or international reinsurance, are showing their limits: low market penetration (2 to 3% of GDP), slow international aid disbursements, the high cost of cover and the lack of depth of African financial markets. Faced with this picture, Africa must explore innovative financing models capable of mobilising private capital on a scale.

Catastrophe bonds (Cat Bonds) constitute a credible response to this challenge. These instruments, already proven in Latin America and Asia, transfer disaster risk to capital-market investors. When a triggering event occurs (earthquake, cyclone, flood), funds are paid quickly to the issuing country, providing immediate liquidity without adding to debt.

This white paper analyses several international experiences: the Philippines, an Asian pioneer, embedded Cat Bonds in its national disaster-financing strategy in

partnership with the World Bank; the Pacific Alliance (Chile, Colombia, Mexico, Peru) demonstrated the feasibility of a multi-country approach pooling risks; alongside other countries. These experiences yield valuable lessons for Africa: the importance of a solid institutional framework, clear governance architecture, and sustained investment in local capacity.

Finally, the white paper identifies six major challenges, grouped in two categories — institutional/regulatory and technical/financial — and puts forward concrete recommendations:

- Strengthen political will and inter-institutional coordination.
- Adapt the legal and regulatory framework to market instruments.
- Improve the availability and quality of climate data.
- Develop the depth and liquidity of African bond markets.
- Reduce structuring costs through shared regional platforms.
- Build a pool of African experts in actuarial science, modelling and risk finance.

In sum, Cat Bonds offer a strategic opportunity to reposition Africa no longer as a mere recipient of post-crisis aid, but as a sovereign actor in its own financial resilience.

Chapter 1: Context and Stakes: Why Africa Needs Cat Bonds

1.1 The Growing Burden of Natural Disasters in Africa

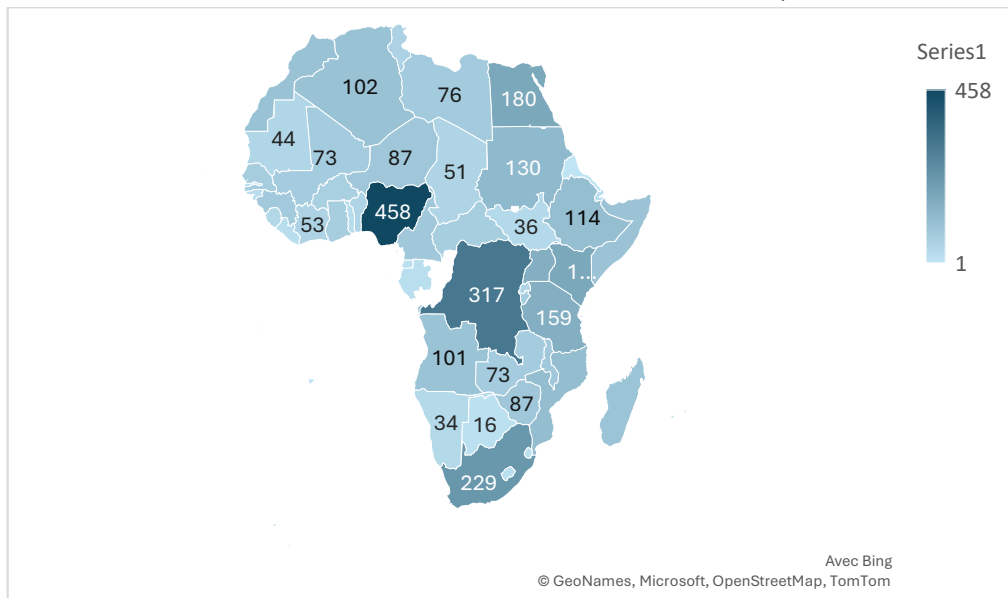
Over the past two decades, Africa has faced an alarming intensification in the frequency and severity of natural disasters. Far from being merely one-off events, prolonged droughts, recurrent floods, tropical cyclones and landslides now form a pattern of systemic risks that strike disproportionately at populations already

vulnerable, hampering the continent's economic and social development.

An upward trend that points to structural vulnerabilities

Over 2000 – 2025, according to the data available on EM-DAT, the African continent recorded more than 4,500 natural disasters and major accidents — an average of more than 170 events per year.

Chart 1: Total number of natural disasters in Africa, 2000 – 2025



Source: EM-DAT

This trend is markedly higher than in previous decades, reflecting a combination of factors: the acceleration of climate change, increased exposure due to rapid and unplanned urbanization, and the persistence of high poverty levels that limit communities' capacity for resilience.

A geographical concentration that highlights risk “hotspots”

These disasters are not evenly distributed. The analysis reveals a striking

geographical concentration: more than 50% of recorded events occurred in only 9 of the 51 countries studied. The “podium” of the most affected nations by number of events is held by:

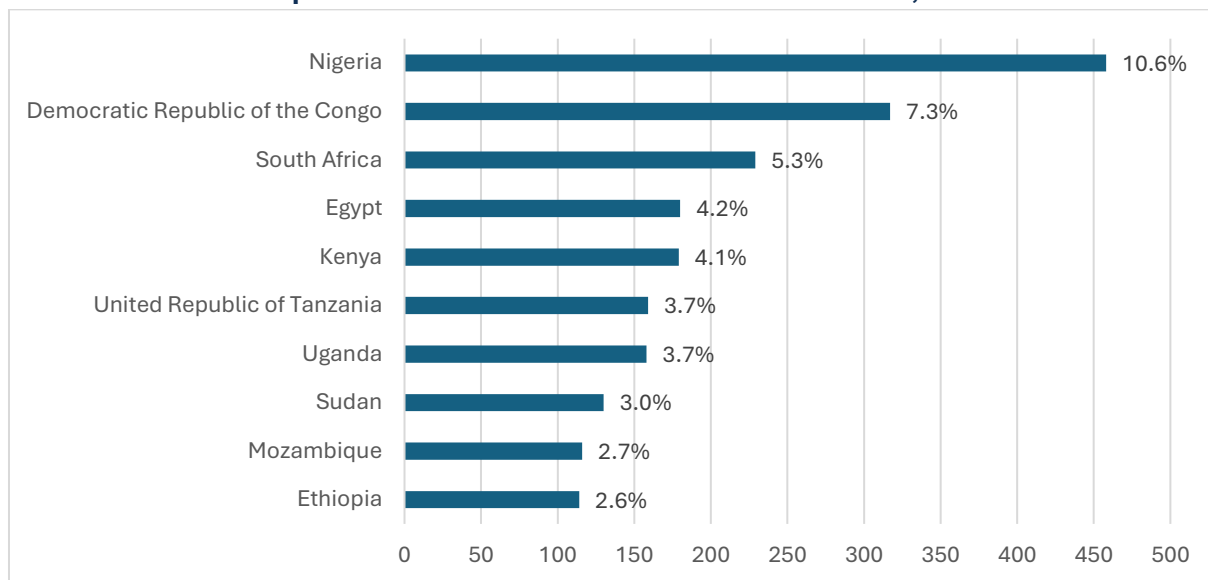
- **Nigeria** (458 events, 10.6%)
- **Democratic Republic of the Congo (DRC)** (317 events, 7.3%)
- **South Africa** (229 events, 5.3%)

This concentration is explained by a combination of country-specific factors.

Nigeria, Africa's most populous country, faces recurrent flooding in its coastal and river areas. The DRC — owing to its size, the population density of certain regions and its socio-political instability — is exposed to a multiplicity of risks (floods,

landslides, epidemics). South Africa, the continent's most industrialised economy, is regularly confronted with severe droughts in the Cape region and floods in KwaZulu-Natal.

Chart 2: Top 10 most affected countries: share of cases, 2000 – 2025

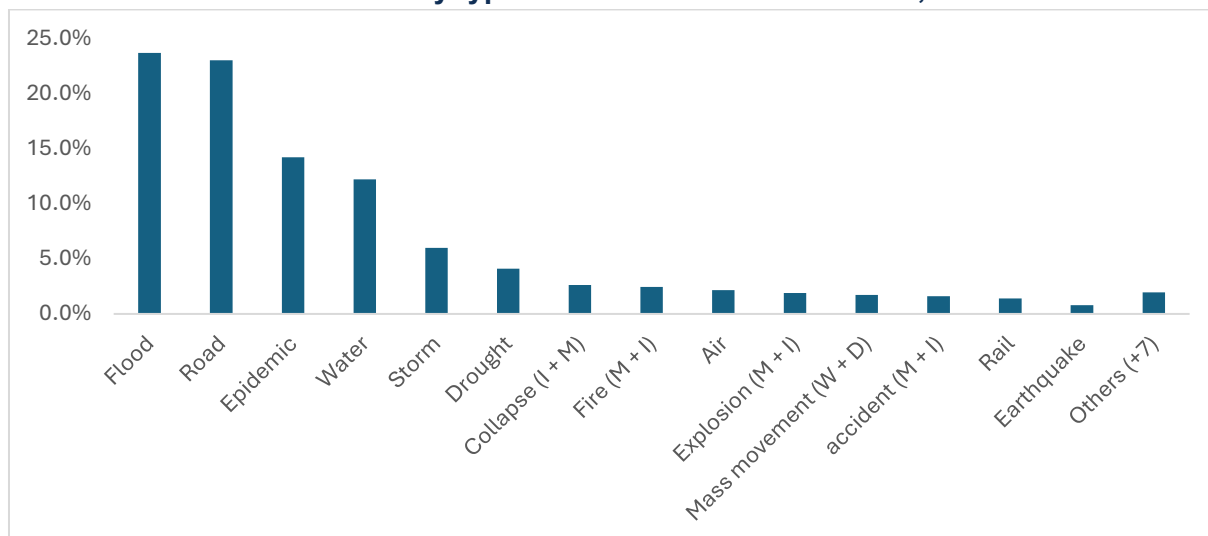


Source: EM-DAT / Authors

Typology of disasters: floods top the list, in a wider context

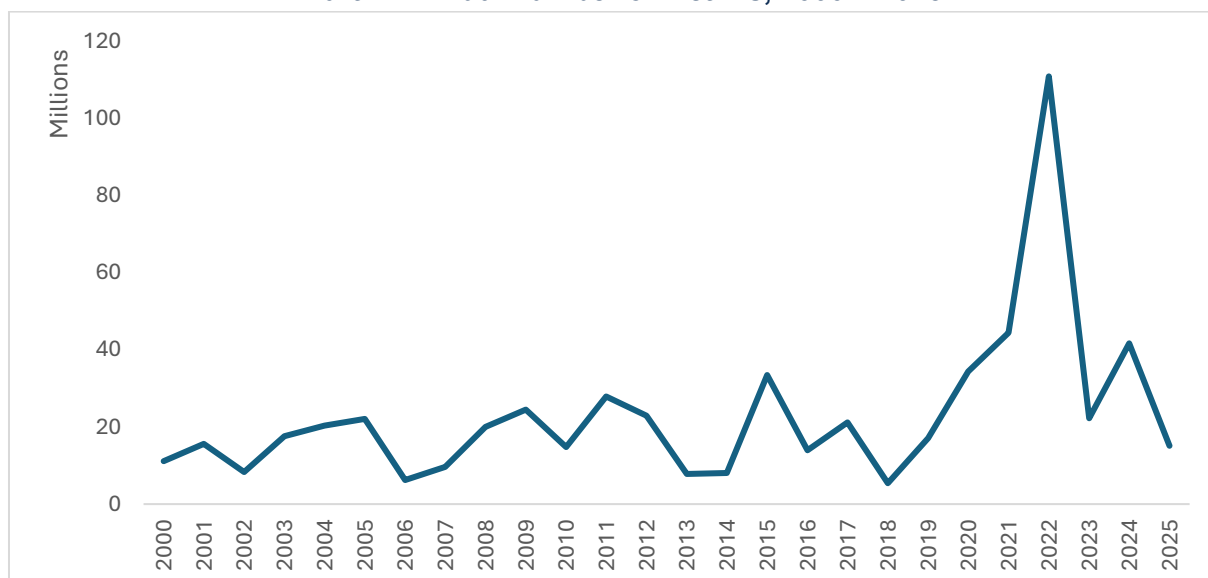
The nature of the disasters encountered in Africa is revealing of the continent's environmental and development challenges. According to EM-DAT, floods come first, accounting for around 24% of events recorded between 2000 and 2025. The phenomenon is exacerbated by a combination of more intense rainfall linked to climate change, deforestation, and inadequate drainage infrastructure in

rapidly expanding cities. Major road accidents follow (23%), then epidemics (14.2%). Their inclusion in disaster databases is significant: it underscores that natural and technological risks are often intertwined. A health system weakened by a flood can trigger a cholera outbreak, and a major road accident is treated as a disaster when local response capacity is overwhelmed. The data shines a light on the systemic vulnerability of African societies.

Chart 3: Breakdown by type of climate disaster recorded, 2000 – 2025


Source: EM-DAT / Authors

Human impact: millions of lives upended

Chart 4: Annual number of victims, 2000 – 2025


Source: EM-DAT

Behind these statistics lies a heavy human toll. On average, more than 22 million people are affected each year by these disasters — through the loss of their homes or livelihoods, injury or death. The year 2022 was particularly dramatic, with more than 100 million people impacted, mainly because of extreme and prolonged droughts in the Democratic Republic of the Congo and Nigeria. That episode is a

reminder of the existential threat drought represents to the continent's food security, affecting harvests and livestock on a massive scale.

Outlook: a future under intense climate strain

This accumulation of disasters comes in a context where Africa is identified by the Intergovernmental Panel on Climate

Change (IPCC) as one of the regions of the world most vulnerable to climate change, even though it contributes the least to global greenhouse-gas emissions. The projected rise in the frequency and intensity of extreme weather events points to a worsening of this trend. According to the report *Shock Waves: Managing the Impacts of Climate Change on Poverty* by World Bank Group experts, more than 100 million additional Africans could fall into poverty by 2030 if current trends continue. All of this poses a colossal challenge for disaster risk reduction, adaptation and climate finance.

1.2 The Limits of Traditional Financing Mechanisms

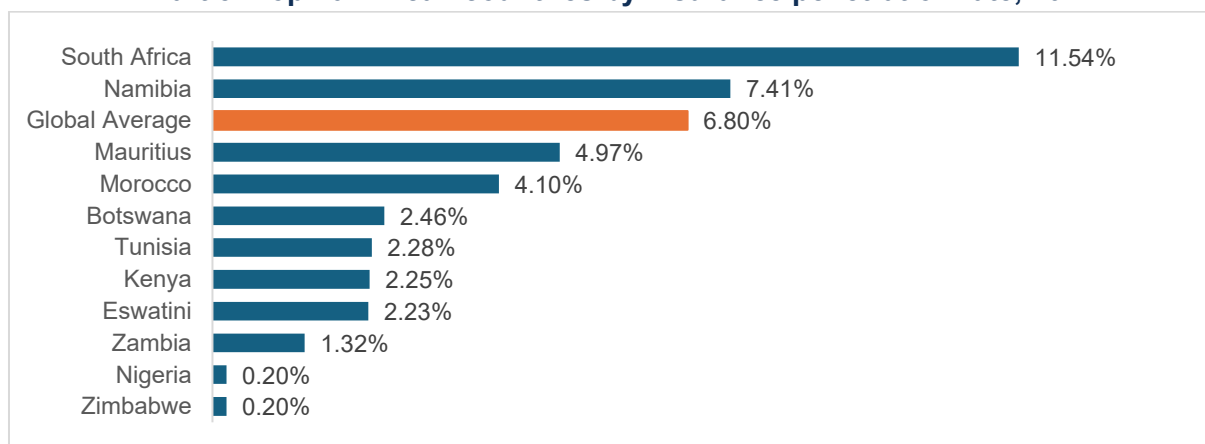
Faced with the surge in natural disasters, African governments and local actors traditionally turn to a limited toolkit of risk-financing instruments. Although tested, these mechanisms reveal deep structural shortcomings, leaving populations and economies in a state of chronic vulnerability. Examining their limits highlights the imperative need for innovative financing models that are more agile and predictable.

Low insurance penetration

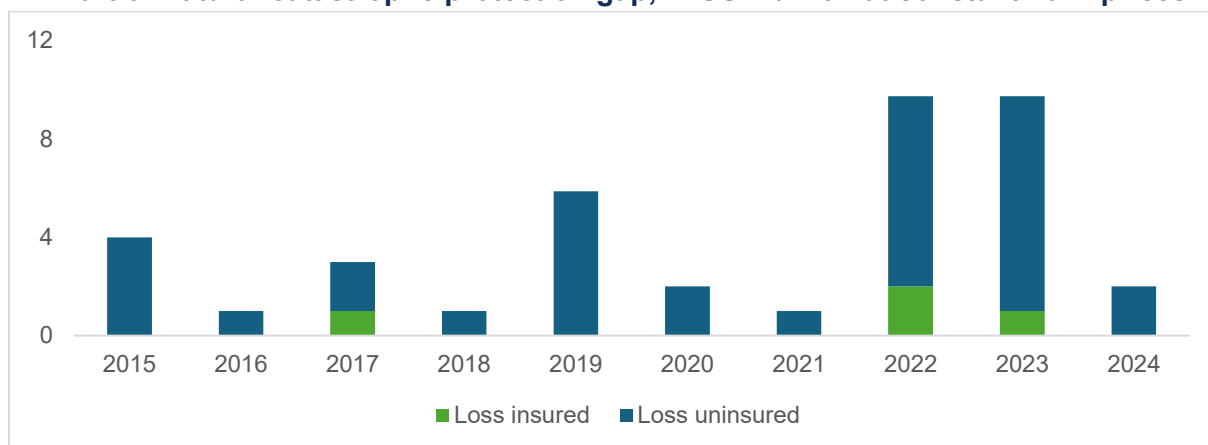
First, the insurance sector — a traditional pillar of financial resilience in developed economies — still plays a marginal role in Africa. The data reveal a worrying picture: insurance penetration averages between 2% and 3% of GDP across the continent, against a global average of around 6.8%. This gap in cover deprives the majority of households, small businesses and even public administrations of an essential safety net in the event of climate shock.

The 2025 report of the African Insurance Organisation (AIO) reveals a multi-speed reality. While South Africa (11.54%) and Namibia (7.41%) post rates comparable to international standards, the great majority of the continent's economies remain significantly behind. Countries that are nevertheless heavily exposed to major climate risks — such as Kenya (2.25%) or Nigeria (0.20%) — show penetration levels that leave them structurally vulnerable. This is explained by a combination of factors: prohibitive premium costs for most of the population, a lack of products tailored to local socio-economic realities, cultural mistrust of the insurance system, and inadequate distribution infrastructure in rural areas.

Chart 5: Top 10 African countries by insurance penetration rate, 2024



Source: AIO 2025 Report

Chart 6: Natural-catastrophe protection gap, in USD billion at constant 2024 prices

Source: Sigma No. 1/2025, Swiss Re

The consequences of this under-insurance are considerable. As Chart 6 shows, the protection gap — the difference between total economic losses and those actually insured — remains chasmic. Over the past 10 years, close to 90% of losses linked to natural disasters in Africa were uninsured, exposing public budgets directly to financial shocks and perpetuating a cycle of post-disaster poverty as affected populations have to draw on already limited resources to fund their own recovery.

International aid: an essential lifeline that is too slow and too small

Post-disaster response relies in large part on international humanitarian aid and emergency funding. Although indispensable for saving lives, these funds are subject to political and bureaucratic vagaries that severely limit their effectiveness.

Slow disbursement is a critical obstacle. As the 2024 annual report of CERF (the United Nations Central Emergency Response Fund) underlines, the time taken to deliver humanitarian projects can stretch up to 12 months after an event. In a context where the first 72 hours are crucial and recovery

must start quickly to avoid a worsening of the crisis, this lag has dramatic consequences: it delays reconstruction, prolongs population displacement and destroys livelihoods, deepening the poverty divide.

The funding deficit is just as worrying. According to the same CERF report, of the USD 575 million in humanitarian aid deployed in 2024, only USD 206 million (35.8%) was earmarked for natural-disaster response. That figure should be set against the assessment of economic losses. The Swiss Re Institute's Sigma No. 1/2025 report estimates direct and indirect economic losses linked to natural disasters in Africa for 2024 at around USD 2 billion.

This stark comparison reveals that dedicated humanitarian aid covered only about 10% of the estimated total economic needs. This financial chasm leaves countries and populations to absorb 90% of the losses on their own, often by drawing on already meagre resources, hindering any prospect of swift recovery and sustainable development.

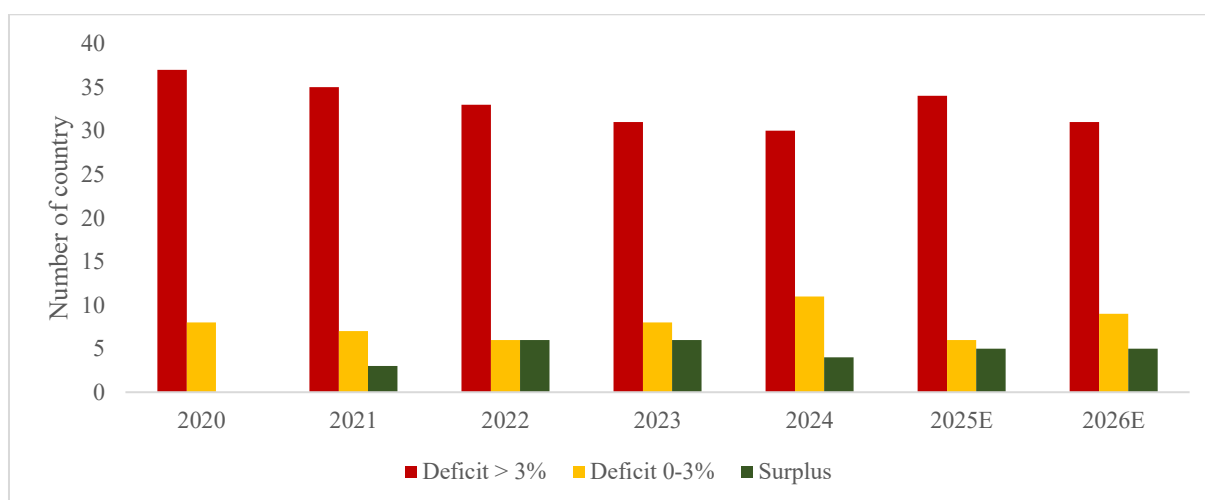
The national budget constraint: an impossible financial equation

African countries' national budgets, already under pressure, cannot fill this gap. They are structurally constrained by pressing social and economic priorities (health, education, security, basic infrastructure) and by limited fiscal space.

The fiscal situation in sub-Saharan Africa is particularly telling. According to the IMF's

Regional Economic Outlook, the majority of countries in the region post worrying public deficits. Of the 45 countries studied, more than 30 (around two-thirds) record a public deficit greater than 3% of GDP (excluding grants), a threshold often regarded as a benchmark for fiscal sustainability in international economic frameworks.

Chart 7: Distribution of sub-Saharan African countries by public deficit (excluding grants)



Source: IMF Database / Authors

This means that governments are already struggling to balance their books in normal times. Coping with unpredictable, costly shocks such as natural disasters becomes a near-impossible challenge. Faced with a major disaster, these States have no choice but to undertake budget reallocations damaging to essential public services, or to take on more debt — often on non-concessional terms — adding to a debt burden already critical for many of them.

In short, the current triptych — late and undersized international aid, depleted national budgets and an embryonic insurance market — creates a systemic gap in risk financing. This triple constraint leaves African economies and their

populations extremely exposed to climate shocks, turning a weather event into a long-term humanitarian and economic crisis. It has become clear that persisting with this reactive model is no longer tenable, which underscores the critical urgency of exploring and deploying proactive, parametric financing solutions — such as catastrophe bonds — to bridge this resilience gap.

1.3 Capital Markets: An Innovative Solution for Africa's Climate Resilience

In a context marked by the inadequacy of traditional financing mechanisms and the worsening climate threat, capital markets emerge not as a mere alternative but as a

transformative, structural solution. They offer the promise of closing the protection gap — the glaring shortfall between economic losses and insured funds — by channeling part of global savings directly into the management of African risks.

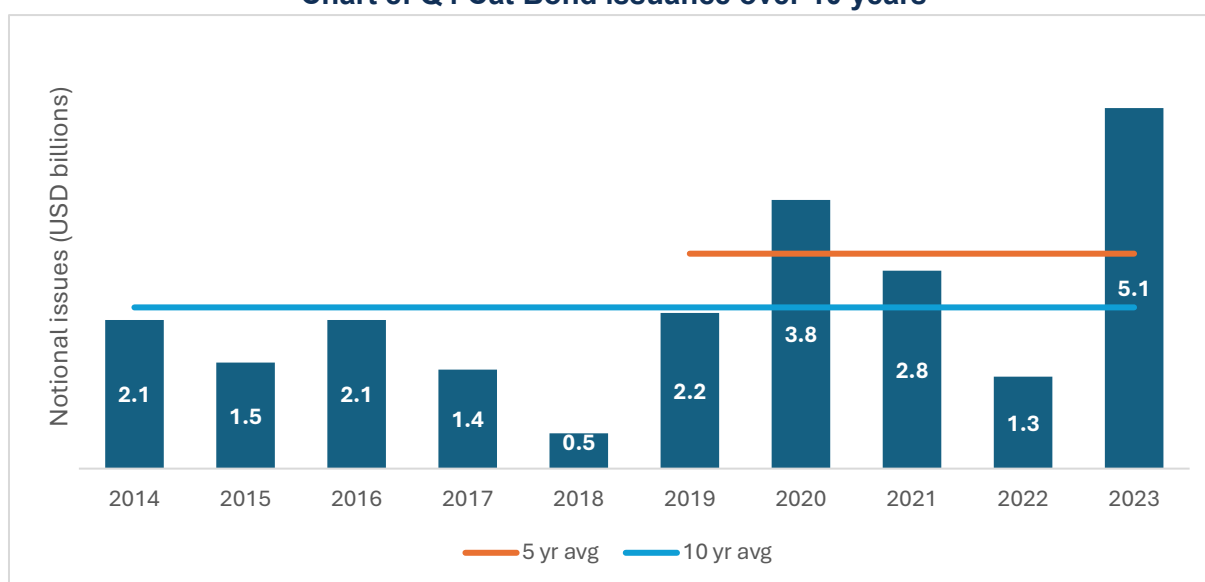
Insurance-Linked Securities (ILS): a global market growing steadily

Insurance-Linked Securities (ILS), and catastrophe bonds (Cat Bonds) in particular, are the most mature instrument for this risk transfer. This is not a theoretical innovation but a tested asset class that has

been growing steadily on the international stage.

As Swiss Re's February 2024 report *Insurance-Linked Securities Market Insights* demonstrates, the market has reached a new level. Average new Cat Bond issuance over the last five years (2020 – 2024) stood at USD 3 billion per quarter, exceeding the USD 2.3 billion-per-quarter average observed over the previous decade. This sustained growth attests to the maturity and robustness of the instrument, as well as to investors' growing appetite for uncorrelated assets.

Chart 8: Q4 Cat Bond issuance over 10 years



Source: Swiss Re, *Insurance-Linked Securities Market Insights*, February 2024

The win-win mechanism of Cat Bonds

The principle of Cat Bonds, refined since the 1990s, is elegant and effective. They transfer specific natural-disaster risks (for example, the intensity of a cyclone hitting Mauritius or rainfall levels in the Sahel) from an issuer (a State, an insurance company) to capital markets via a special-purpose vehicle (SPV). This creates a dual promise, with tangible benefits:

- **For African insurers, reinsurers and States:** It provides an immediately activatable contingent line of credit. Funds are pre-positioned and guaranteed. When a predefined event is triggered, liquidity is released within days or weeks — with no negotiation, no administrative red tape and no addition to sovereign debt. That is a revolution compared with humanitarian-aid timelines.

- **For institutional investors (pension funds, insurers, sovereign wealth funds, etc.):** Cat Bonds offer attractive returns, often higher than those of conventional bonds with similar ratings, owing to the risk premium they carry. Above all — and this is their most valuable feature — they show extremely low, even nil, correlation with the cycles of traditional financial markets.

The value of Cat Bonds in a portfolio lies not only in their yield, but in their capacity

to diversify and reduce overall risk. As the correlation matrix below illustrates, based on data from asset manager Vanguard, the performance of Cat Bonds is largely independent of movements in US equities, bonds or commodities. A cyclone in Mozambique has no causal link with a stock-market correction in New York or a monetary-policy decision by the European Central Bank (ECB). This decorrelation makes Cat Bonds a safe-haven asset in periods of market volatility, significantly improving portfolios' Sharpe ratio — their risk-adjusted performance.

Table 1 — Correlation matrix (heatmap)

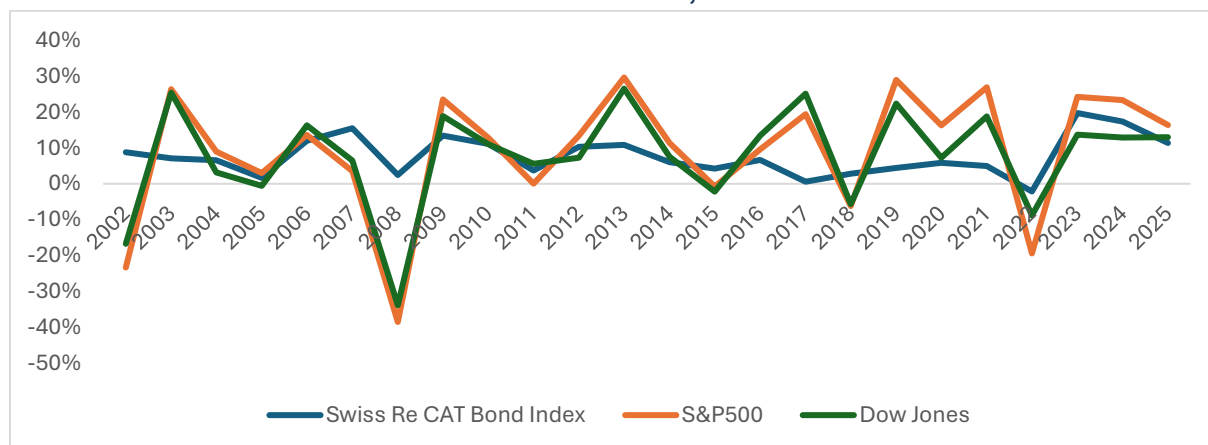
	Cat Bonds	US Stocks	Commodities	US Aggregate	US HY
Cat Bonds	1	0.24	0.19	0.28	0.29
US Stocks	0.24	1	0.41	0.08	0.71
Commodities	0.19	0.41	1	0.01	0.47
US Aggregate	0.28	0.08	0.01	1	0.29
US HY	0.29	0.71	0.47	0.29	1

* Correlation based on monthly returns from January 2022 to December 2023. — Source: Vanguard

The historical record confirms this. Over 2002 – 2025, the relatively stable Swiss Re Cat Bond Index posted robust performance with much lower volatility than other benchmark equity indices such as the S&P 500 and the Dow Jones. The Sharpe ratio

of Cat Bonds (0.79) is more than double that of the S&P 500 (0.34) or the Dow Jones (0.31), demonstrating a significantly better reward per unit of risk taken. For an investor, that signals superior efficiency.

Chart 9: Annual returns, 2002 – 2025



Source: Macrotrends / Artemis

Table 2 — Sharpe ratio of Cat Bonds compared with other asset classes

	Swiss Re Cat Bond Index	S&P 500	Dow Jones
Average annual return	7.71%	9.28%	7.77%
Volatility	5.33%	17.01%	13.85%
Risk-free rate (~5y)	3.5%	3.5%	3.5%
Sharpe ratio	0.79	0.34	0.31

Source : Authors

Transparency, speed and sovereignty: beyond finance

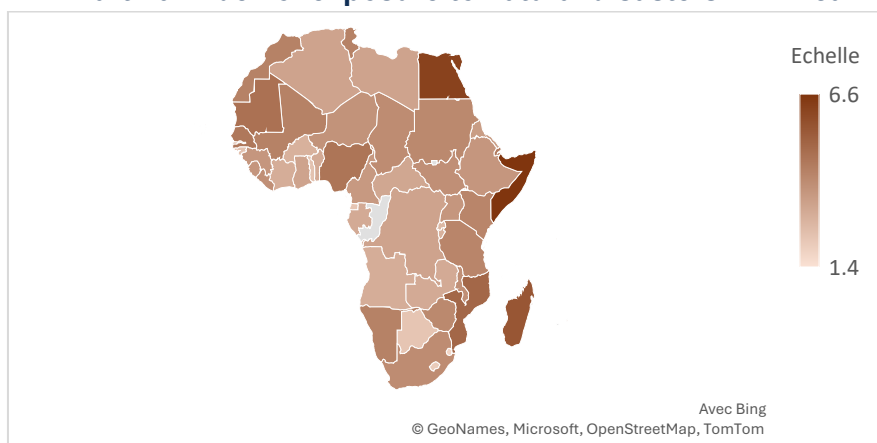
The advantages of Cat Bonds extend beyond the financial frame alone. Their structure brings unprecedented discipline and transparency:

- **Objective parametric trigger:** payment is conditioned on the occurrence of a measurable physical event (e.g. wind speed above threshold X at a specific weather station), eliminating any dispute over indemnification and accelerating the process to an unmatched speed.
- **Strengthening sovereignty:** by relying on these instruments, African countries take back control of their crisis management. They

cease to be aid recipients and become sophisticated clients of the capital markets, securing a fast, predictable and dignified financial response no longer dependent on international political agendas.

In sum, for Africa, the development of these markets is no longer an option but a strategic imperative. It is about turning climate exposure — perceived as a vulnerability — into an opportunity to attract innovative international capital. By creating tailored regulatory frameworks and structuring the first pilot issuances, the continent can build proactive financial resilience, protect its development budgets and secure the future of its populations against the inevitable climate shocks ahead.

Chart 10: Index of exposure to natural disasters in Africa



Source: INFORM Risk Index Mid-2025 (European Commission)

Chapter 2: Cat Bonds: Principles, Mechanics and Lessons Learned

2.1 Understanding Cat Bonds

Catastrophe Bonds (Cat Bonds) represent a leading financial innovation for risk transfer. They are sophisticated securitisation instruments that transfer a specific natural-disaster risk from a “sponsor” (issuer) to the capital markets, providing additional cover capacity to the traditional reinsurance sector.

Mechanics and the role of actors: a structured ecosystem

The mechanism rests on a well-defined value chain and three interdependent actors, organised around a special-purpose vehicle (SPV) that ensures security and transparency.

The Sponsor (Cedant): this party initiates the transaction. Wishing to hedge against a specific risk (e.g. drought in the Sahel, cyclones in the Mozambique Channel), it pays a premium (the “spread”) to transfer the risk. Sponsors may be:

- States or public entities (such as the Government of Kenya or a regional organisation).
- Insurers or reinsurers seeking to offload part of their risky portfolio.

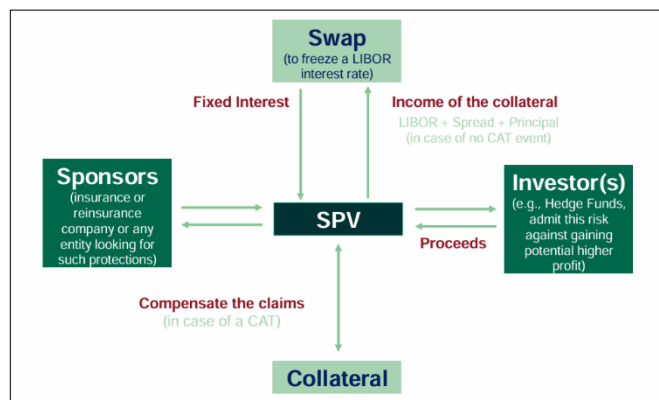
- Public insurance pools (such as the African Risk Capacity).

The Special Purpose Vehicle (SPV): this independent legal entity, often established in regulated financial centres (such as Bermuda), is the operational core of the issuance. Its role is threefold:

- Issue the Cat Bond and collect investors' capital.
- Place that capital in full as collateral in very high-quality, low-risk assets (typically highly rated government bonds).
- Manage cash flows: pay coupons to investors (a combination of the collateral yield and the sponsor's spread) and, if applicable, release the collateralised capital to the sponsor when the catastrophic event occurs.

The Investors: they provide the capital and bear the risk in exchange for an attractive yield. Typically pension funds, asset managers, specialist hedge funds (ILS funds) and insurers. Their motivation lies in this asset's decorrelation from traditional financial markets.

Simplified diagram: how a Cat Bond works



Trigger types

The choice of trigger is central to structuring a Cat Bond. It determines when and how funds are paid to the sponsor after a disaster. Four main families of triggers can be distinguished, each with its advantages and limits in the African context.

	Indemnity	Parametric	Modelled	Hybrid
Definition	Payment is triggered based on actual losses suffered by the insurer or State, calculated from declared claims.	Payment is based on the occurrence of a measurable parameter linked to the disaster (e.g. rainfall, wind speed, earthquake magnitude).	Payments are determined by risk models that simulate probable losses based on the intensity of the event.	Combination of several trigger types (e.g. parametric + modelled, or parametric + indemnity).
Advantages	Perfect match between cover and actual losses is indemnified exactly to its exposure.	Speed (days/weeks), transparency, data independence (weather stations, satellites, international agencies).	Compensates for the absence of detailed insurance data while drawing on scientific foundations.	Balance between speed (parametric) and accuracy (indemnity or modelled).
Limits	Long settlement times, need for reliable data, strong dependence on insurance systems.	Basis risk (payment may not always match actual losses).	Technical complexity, need for external expertise, investor confidence.	More complex structure and higher transaction costs.
Relevance in Africa	Difficult to implement in the short term given low insurance penetration and the lack of consolidated data.	Highly suitable, as it bypasses administrative delays and the weaknesses of local insurance systems.	Relevant in the medium term, notably through partnerships with modelling firms (Swiss Re, RMS, AIR).	Promising in the medium and long term, to address urgent needs (rapid payment) while minimising the gap with actual losses.

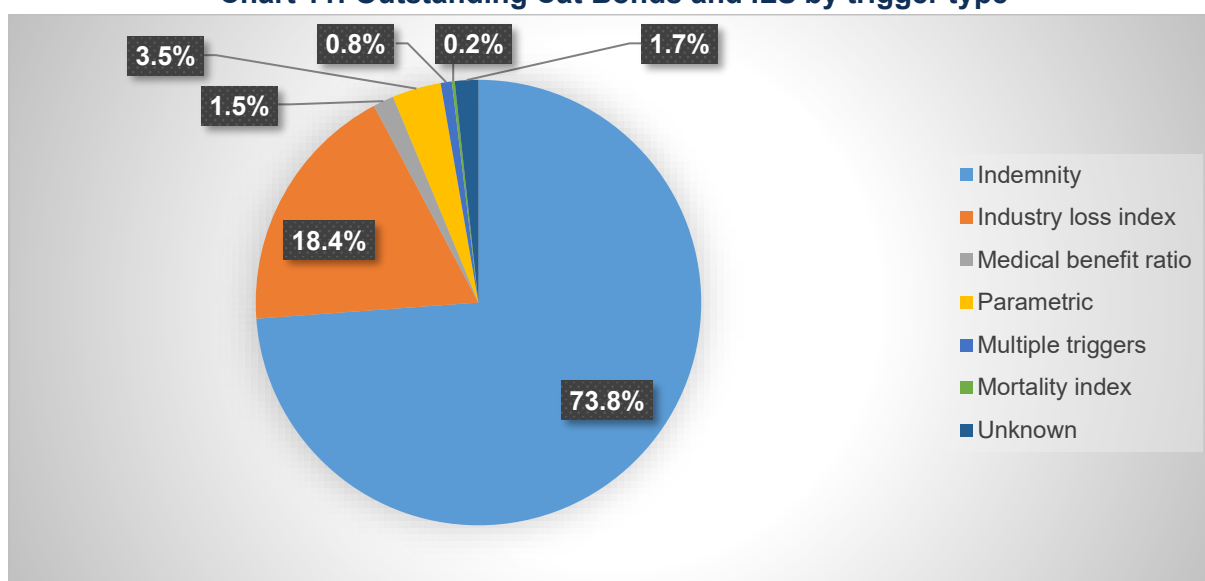
Beyond this typology, the data show a global dominance of indemnity triggers (73.8%) and industry-loss indices (18.4%).

Pricing and modelling principles

Cat Bond pricing rests on a combination of extreme-event modelling, probabilistic loss

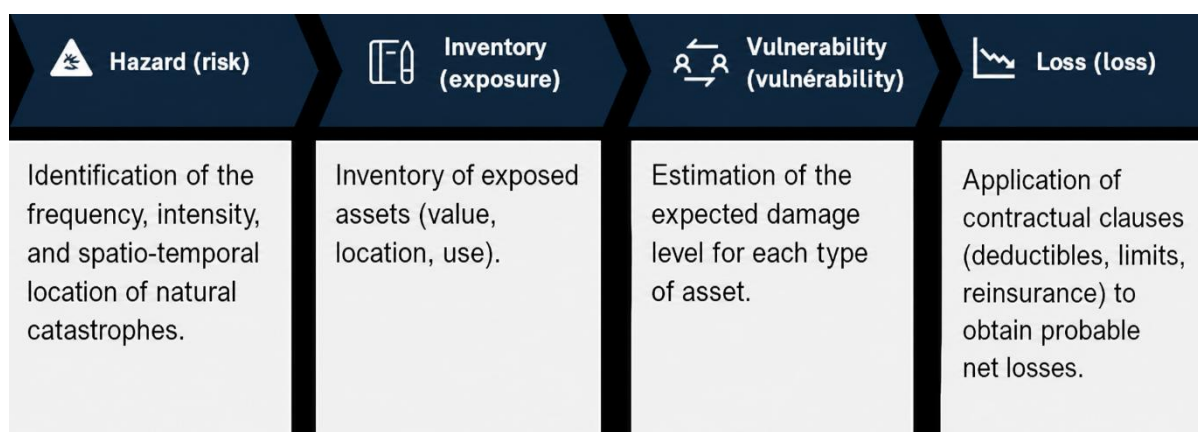
assessment, and comparison with capital-market conditions. Unlike traditional reinsurance, where prices rely largely on claims history, Cat Bonds require an integrated approach combining natural sciences, engineering, actuarial science and finance.

Chart 11: Outstanding Cat Bonds and ILS by trigger type



Source: Artemis (accessed 20/10/2025)

Cat Bond modelling follows four essential steps.



The models, developed mainly by RMS, AIR Worldwide and EQECAT, produce key metrics such as:

- **Average Annual Loss (AAL):** expected average annual loss.
- **Probable Maximum Loss (PML):** the probable maximum loss over a given period.
- **Exceedance Probability (EP Curve):** the probability that a given loss will be exceeded, used to calibrate the trigger threshold and the risk premium.

The total coupon paid to investors comprises two main components: the collateral yield, generally indexed to the risk-free rate (e.g. US Treasury bills), and the spread, which compensates the investor for the risk of capital loss. The spread is determined from the expected loss and market factors. Investors generally require a net yield 2 to 8 percentage points above the risk-free rate, depending on the rarity and severity of the risk covered:

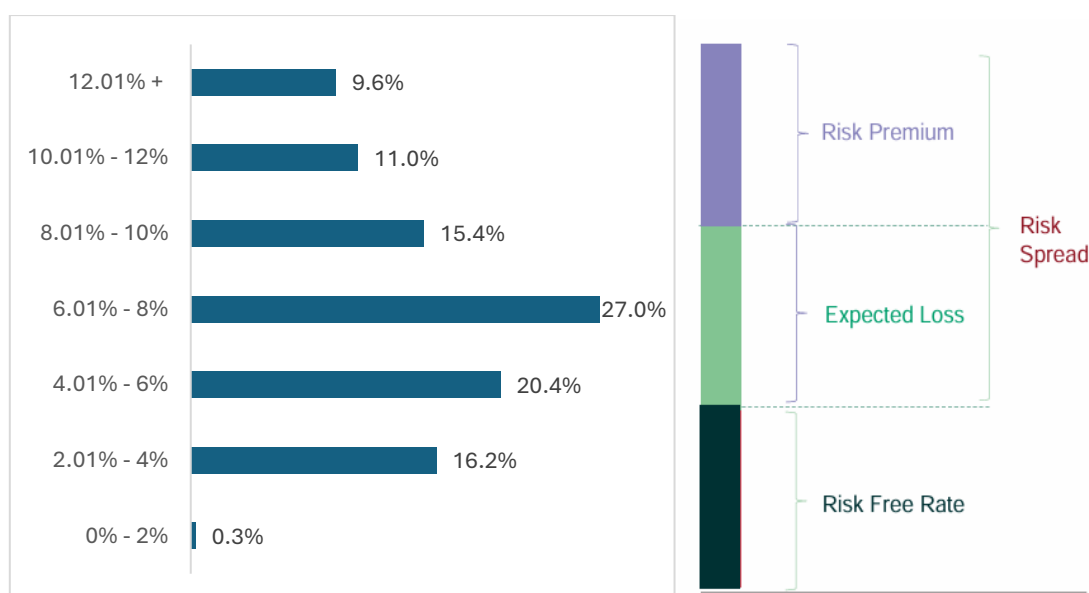
- The risk-free rate and the bond's maturity.

- A liquidity and duration premium (higher for rare or long-dated issuances).
- The expected loss calculated via the risk model.
- An uncertainty premium, linked to data reliability or the exceptional character of the peril.
- Structural features (trigger type, collateral, payment priority).

- Investor demand and competition in the financial markets.

Artemis data (2025) show that Cat Bond spreads break down broadly as follows: 27% of issuances carry a spread of 6.01 – 8%, 21% between 4.01 – 6%, and 16% between 2.01 – 4%. These margins reflect both the growing demand for uncorrelated assets in institutional portfolios and the rise in global climate risk.

Chart 12: Outstanding Cat Bonds and ILS by spread



Source: Artemis - Consulté le 20/10/2025

Because natural disasters are rare, extreme events, the probability of their occurrence is subject to uncertainty. Some models therefore incorporate “Uncertainty Theory”, which combines expert judgement and subjective distributions to improve pricing accuracy when historical data are limited. This approach is particularly relevant for African countries, where event databases and statistical series remain incomplete.

2.2 Case Studies: Lessons and Best Practice from Cat Bonds in Emerging Countries

Case study 1 — The Philippines: transferring the cost of natural disasters to the capital markets

The Philippines is among the countries in the world most exposed to natural disasters. Its geographical position — at the convergence of tectonic plates and at the heart of the Pacific typhoon belt —

makes the country particularly vulnerable to earthquakes, tropical cyclones and extreme rainfall.

According to the World Bank, the country records, on average, more than 20 tropical storms a year, several of them of high intensity. One of the most devastating events, Typhoon Haiyan (Yolanda) in 2013, caused more than 6,300 deaths and around USD 12.9 billion in damage — close to 4.7% of national GDP.

Confronted with this recurrence of climate shocks, from 2017 onwards the Philippine government launched an ambitious strategy of integrated disaster-risk management. It rests on a set of complementary financial mechanisms: sovereign insurance, contingent loans (*Catastrophe Deferred Drawdown Option* – CAT DDO), and now risk transfer to the capital markets through Cat Bonds.

The 2019 Cat Bond issuance pursued three essential objectives:

- Protect public finances against losses linked to earthquakes and cyclones, without increasing sovereign debt.
- Access rapid and predictable cover, guaranteeing disbursement within weeks of an event.
- Stabilise the cost of insurance through a fixed premium over the life of the contract, limiting the country's exposure to volatility in the reinsurance market.

This mechanism made it possible to convert a random budgetary risk into a known insurance charge, providing greater visibility for public-finance planning.

In November 2019, the World Bank — acting as financial intermediary — issued two tranches of catastrophe bonds for a total of USD 225 million:

- **Tranche A (USD 75 m):** earthquake cover.
- **Tranche B (USD 150 m):** cover against tropical cyclones and excess rainfall.

These bonds were issued under the World Bank's "Capital-at-Risk Notes" programme, allowing investors to subscribe to instruments whose principal is placed at risk in the event of a major disaster.

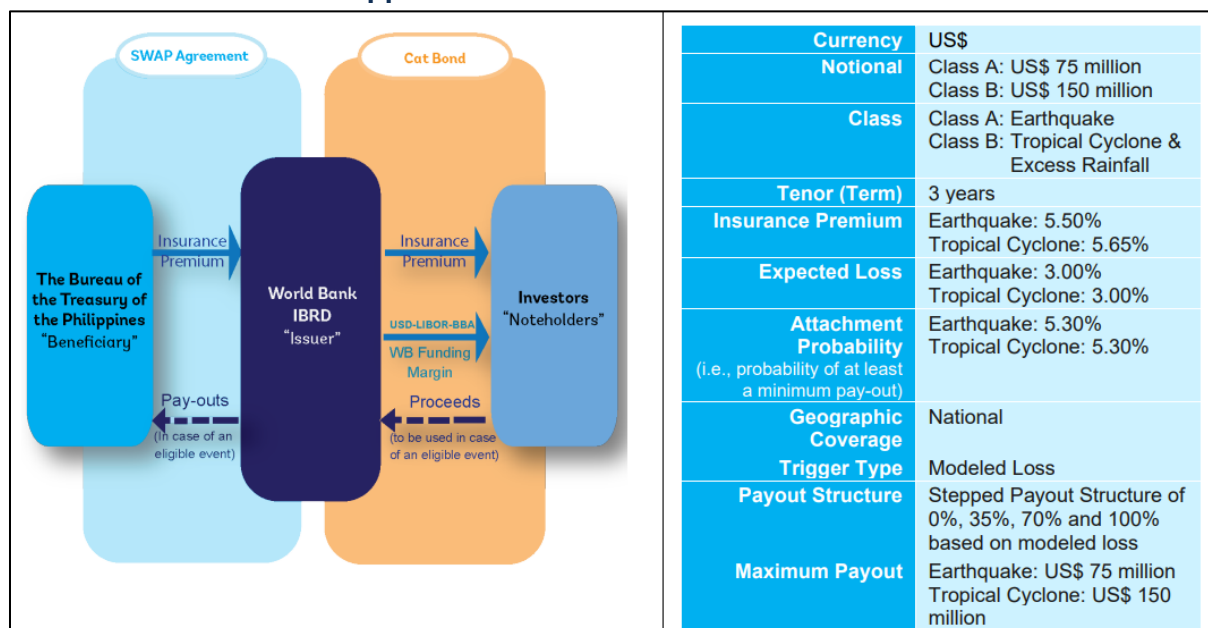
The World Bank entered into a swap agreement with the Philippine government:

- The country pays an annual insurance premium (5.5% for the earthquake tranche, 5.65% for the cyclone tranche), which is passed through to investors.
- If triggered, the funds raised on the markets are paid directly to the government, with no procedure to assess actual losses.

The parametric trigger relies on a modelled-loss trigger, incorporating data on magnitude, wind speed and rainfall. Payments follow a stepped-payout structure: 0% (no loss), 35%, 70% or 100% of the insured amount, depending on the severity of the modelled event.

Attachment probabilities (the minimum trigger threshold) were set at 5.3% for both perils, with an expected loss of 3% — reflecting an average risk level for investors.

Philippines Cat Bond : transaction structure



Source: World Bank, "Case Study Philippines" report

On 16 December 2021, Typhoon Rai (Odette) — one of the most powerful storms recorded since 2013 — struck the centre and south of the Philippines. The event partially triggered the Cat Bond, automatically generating a payout of USD 52.5 million to the Philippine government, paid out within just a few weeks of the validation of the independent calculation agent's report.

This payment was concrete proof of the mechanism's effectiveness: it financed emergency operations, the relocation of populations and the early stages of reconstruction immediately, without waiting

for international aid to arrive. The Philippine Department of Finance hailed the transaction as an example of "applied fiscal resilience", demonstrating the country's ability to mobilise innovative financial solutions to protect its economy against climate shocks.

In addition, the stability of the cost of insurance allowed the government to plan its expenditure over three years while accessing an ex-ante, non-debt source of financing. This approach also strengthened the confidence of donors and markets in the country's macroeconomic soundness, supporting its credit rating.

Philippines partnership timeline



Source: World Bank, "Case Study Philippines" report

Case study 2 — The Pacific Alliance: regional pooling of seismic risk

The member countries of the Pacific Alliance (Chile, Colombia, Mexico and Peru) share two major structural features: deep regional economic integration and extreme exposure to seismic risk. Located along the Pacific “Ring of Fire”, these States regularly experience high-magnitude earthquakes. The Maule (2010; 8.8 Mw, Chile), Pisco (2007; 8.0 Mw, Peru) and Oaxaca (2020; 7.4 Mw, Mexico) earthquakes all illustrated the systemic vulnerability of their infrastructure and public finances.

Against this backdrop, the four countries' finance ministers recognised the need for a collective and innovative instrument capable of providing rapid, predictable financing after an earthquake while avoiding an increase in sovereign debt. The Pacific Alliance regional Cat Bond initiative was thus born in February 2018, under the technical and financial coordination of the World Bank. The initiative pursued several common objectives:

- Expand financing options available in the event of a disaster, beyond national budgets and emergency borrowing.
- Obtain rapid and predictable financing, mobilisable immediately after an earthquake.
- Strengthen governments' technical capacity in modelling, insurance and market-based risk-transfer instruments.
- Reduce unit cover costs through regional pooling and legal standardisation.

This model reflects a modern approach to risk financing, where regional cooperation becomes a tool of financial efficiency and budgetary sovereignty.

In February 2018, the World Bank — through its “Capital-at-Risk Notes” programme — issued catastrophe bonds on behalf of the four countries totalling USD 1.36 billion: the largest issuance ever made for seismic risk globally. The transaction was split into five tranches:

Country	Amount (USD)	Maturity	Annual risk premium
Chile	500 million	3 years	2.50%
Colombia	400 million	3 years	3.00%
Mexico (A)	160 million	2 years	2.50%
Mexico (B)	100 million	2 years	8.25%
Peru	200 million	3 years	6.00%

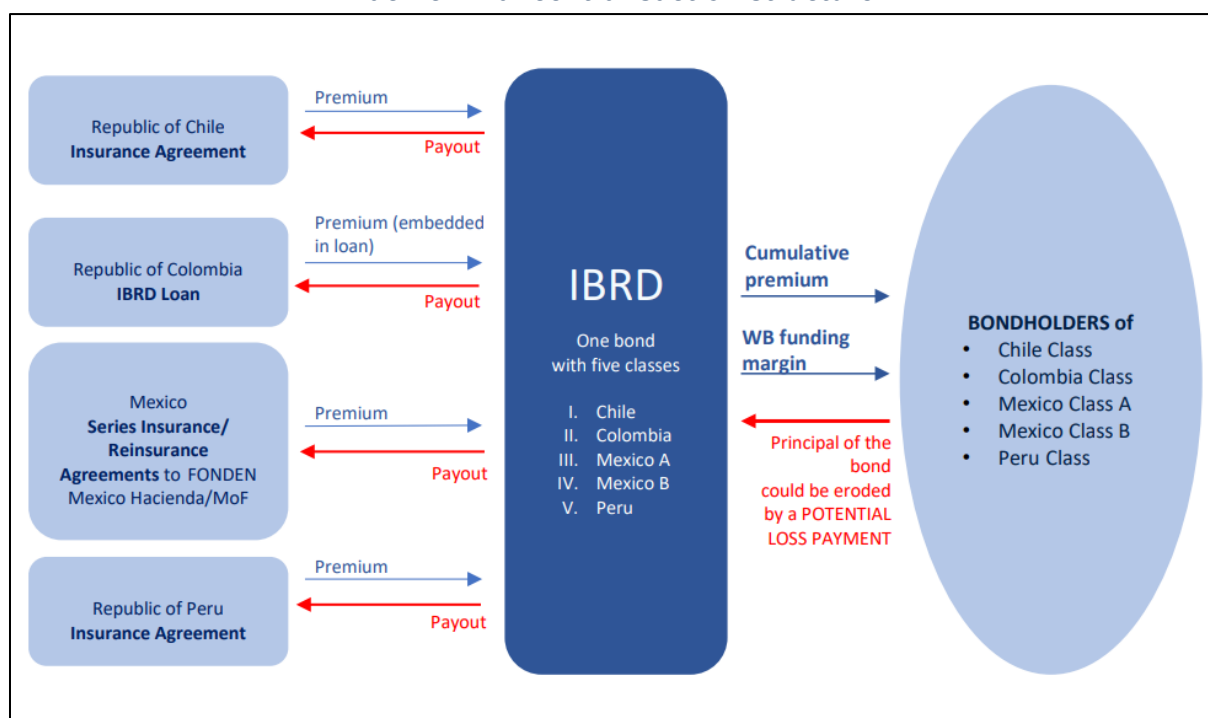
Source: World Bank, “Case Study Pacific Alliance” report

The financial architecture was innovative on several counts:

- A single bond instrument issued by the World Bank, structured into five independent risk classes.

- Each country benefited from a specific insurance or reinsurance contract with the World Bank (or an integrated loan in the case of Colombia).
- When triggered, payments were transferred directly to governments via bilateral agreements.
- Investor capital was partially or wholly lost depending on the magnitude and location of the earthquake, following a parametric trigger calibrated on regional seismological models.
- The legal model was carefully tailored to each national framework (constitution, financial regulation, procurement rules), while standardising documentation to lower costs and accelerate implementation.
- The transaction mobilised some thirty institutions: international law firms, risk-modelling firms (AIR Worldwide), and investment funds specialised in Insurance-Linked Securities (ILS).

Pacific Alliance: transaction structure



Source: World Bank, “Case Study Pacific Alliance” report

The central role of the World Bank — providing end-to-end support, from technical preparation through to issuance on the markets — enabled the four States to obtain a AAA rating on the issuing vehicle, an essential condition for attracting major institutional investors. The result was

spectacular: more than 45 international investors participated in the issuance, generating USD 2.5 billion in orders for an issued volume of USD 1.36 billion. This oversubscription drove the initial premiums lower and demonstrated markets' growing appetite for climate-resilience assets.

Other examples of catastrophe risk cover around the world

Mexico: Mexico is one of the first countries to have institutionalised the use of catastrophe bonds. As early as 2006, it launched the MultiCat programme, designed in partnership with the World Bank to enable sovereign and sub-sovereign States to bundle several risks (earthquakes, cyclones, extreme rainfall) into a single portfolio, thereby lowering the cost of insurance. In 2015, following the passage of Hurricane Patricia — one of the most powerful cyclones ever recorded worldwide — Mexico received a payout of USD 50 million. In 2017, after a magnitude-8.2 earthquake struck the south of the country, an indemnification of USD 150 million was paid out under a USD 360 million Cat Bond issued via the World Bank.

Uruguay: in 2013, the World Bank structured an innovative climate-insurance transaction worth USD 450 million on behalf of the Uruguayan public electricity company UTE. The deal simultaneously covered water shortages — affecting hydroelectric power generation — and increases in the price of oil, which impacted the cost of energy imports. With an 18-month tenor, this cover enabled Uruguay to protect the financial stability of its energy system in the face of the combined hazards of climate and the global energy market. The case illustrates the flexibility of risk-transfer instruments, applicable beyond strict natural disasters to cover macroeconomic shocks linked to energy dependence.

Pacific Islands: the small island States of the Pacific (Tonga, Vanuatu, Samoa, Cook Islands, etc.) face climate risks that are

extreme relative to the size of their economies. With World Bank support, these countries set up a regional natural-disaster insurance mechanism combining technical assistance with intermediation in the international reinsurance market. This pooled model has made it possible to offer specific national insurance policies while bundling risks in a more diversified joint portfolio; to reduce the unit cost of cover thanks to regional economies of scale; and to accelerate post-disaster payments. Following Cyclone Ian in 2014, the Kingdom of Tonga received a payment of USD 1.27 million, while Cyclone Pam in 2015 triggered a payout of USD 1.9 million for Vanuatu. These rapid disbursements financed emergency relief and supported economic recovery in the weeks after the disaster.

Caribbean: in the Caribbean region, the World Bank played a structuring role by supporting the creation of the Caribbean Catastrophe Risk Insurance Facility (CCRIF) in 2007. Between 2007 and 2014, the mechanism relied mainly on cat swaps before the issuance in 2014 of a three-year Cat Bond covering both hurricane and earthquake risks for CCRIF member States. Throughout this period, the facility paid out tens of millions of dollars to member States (Haiti, Dominica, Saint Lucia, etc.) in the wake of natural disasters.

These experiences show that catastrophe bonds and natural-risk derivatives can be adapted to a wide range of contexts. For Africa, they offer a practical toolkit for designing financial instruments tailored to the diversity of its climate risks, whether Sahelian floods, agricultural droughts or coastal cyclones.

Key lessons from the case studies and implications for Africa

Lessons from international experience	Transferable lessons for Africa
Political commitment is a decisive factor.	A successful African Cat Bond presupposes clear ownership by the Ministry of Finance and inclusion in the national budgetary strategy.
The catalytic role of multilateral institutions is central.	The AfDB, ARC or Afreximbank can serve as technical intermediaries and credibility anchors vis-à-vis investors.
Parametric triggers facilitate rapid payments.	Favour simple, public and verifiable triggers (meteorological, seismological, hydrological) to limit delays and disputes.
Fixed costs impose minimum issuance sizes.	Consider pooled issuances (multi-country or multi-peril) to reach attractive volumes.
Cat Bonds reinforce budgetary discipline.	Embed Cat Bonds in public-debt management and fiscal-sustainability frameworks.
Data quality drives pricing.	Invest in national climate-data systems (ACMAD, AGRHYMET, national meteorological services).
Transparent trigger rules are essential.	Define simple, intelligible protocols to strengthen the confidence of States and investors.
Cat Bonds are complementary, not substitutive.	Cat Bonds must be embedded in a hybrid risk-financing architecture.
Institutional learning is gradual.	Start with national pilot projects before considering regional scale-up.
International credibility attracts private capital.	Rely on recognised partners to access international markets.

2.3 Limits and Conditions of Use of Cat Bonds

While catastrophe bonds are an innovative and effective risk-transfer instrument, their use is subject to a number of structural, technical and operational limits which should be taken into account in order to assess their true reach.

An instrument suited to extreme risks, less relevant for frequent risks

Cat Bonds are mainly designed to cover rare but high-impact events (low-frequency / high-severity events), such as major cyclones, high-magnitude earthquakes or exceptional floods. They are, by contrast, poorly suited to recurrent or low-intensity risks — such as seasonal flooding or

moderate droughts — which fall more naturally within the scope of conventional insurance mechanisms or budgetary contingency funds.

In that sense, Cat Bonds cannot replace the full range of risk-management instruments but should be regarded as a complementary tool, embedded in a comprehensive resilience-financing strategy.

High structuring costs

Setting up a Cat Bond entails significant fixed costs: risk modelling, legal structuring of the SPV, financial advisory fees, calculation agents, legal documentation, rating, investor roadshow, and so on. These costs make the instrument poorly profitable for modest cover amounts and explain why issuances are generally above USD 50 – 100 million.

For many African countries, these costs constitute a significant barrier to entry, which argues in favour of pooled mechanisms (multi-country) or standardised platforms led by multilateral institutions.

In that sense, Cat Bonds are aimed primarily at States, insurers or reinsurers, or large public enterprises. They are not suited to small local authorities or to ordinary private companies, owing to their legal and financial complexity. Their use presupposes a minimum level of institutional capacity in financial governance and risk management.

Basis risk in parametric triggers

Most Cat Bonds rely on parametric triggers (wind intensity, earthquake magnitude, rainfall levels, etc.). While these mechanisms allow for fast and transparent payments, they also expose beneficiaries

to a basis risk — the risk that a disaster causes substantial losses without the parametric threshold being met, thereby preventing payment.

This risk calls for very rigorous parameter design and high-quality climate and geophysical data.

Chapter 3 : Challenges and Recommendations

Developing an African market for catastrophe bonds (Cat Bonds) represents a strategic step forward in strengthening the continent's financial resilience to the build-up of climate risks. However, the effective implementation of these innovative financial instruments rests on a set of institutional, regulatory, technical and financial conditions that are, for now, only partly in place. International experience — from Mexico to the Philippines via the Pacific Alliance — consistently shows that the success of these sophisticated operations requires a combination of sustained political commitment, an appropriate legal framework, solid technical capacity and structured multilateral cooperation. This chapter examines in depth the main challenges holding back the emergence of Cat Bonds in Africa, while putting forward concrete and realistic ways to overcome them.

3.1 On the Institutional and Regulatory Front

Political will that remains fragmentary

Challenge

The sine qua non condition for a successful deployment of Cat Bonds lies in the emergence of a clear political will to treat climate-risk management not as a mere emergency response but as a fundamental pillar of strategic economic planning. In most African countries, however, disaster-financing arrangements remain essentially reactive in orientation, heavily dependent on international aid or emergency budgets unlocked under duress. This fragmentary

approach considerably limits States' capacity to equip themselves with sophisticated ex-ante protection mechanisms such as Cat Bonds, which on the contrary require rigorous financial planning and deep inter-institutional coordination across the ministries of finance, environment and the interior.

Recommendation

To shift this dynamic, it is imperative to embed climate-risk management in the very architecture of national budgetary strategies. Cat Bonds must be structurally integrated into Medium-Term Budgetary Frameworks (MTBFs) and into sovereign debt-management strategies, on a par with traditional development-financing policies. Jamaica's example is particularly instructive: the country has elevated the Cat Bond into a central budgetary instrument, explicitly integrating it into its multi-year Debt Management Strategy. This proactive approach has enabled the island to secure funds immediately mobilisable in the event of a major hurricane, without weighing on its public-debt burden. African countries would do well to draw inspiration from this model by creating national governance committees on climate financial risk, placed under the direct authority of the Ministries of Finance, thereby ensuring coherence between climate, budgetary and insurance policies. Such bodies could draw on the IMF's recommendations advocating an increase in the share of national budgets allocated to climate-risk management in the most exposed countries.

A legal and regulatory framework that is not fit for purpose

Challenge

Catastrophe bonds require specialised and precise legal infrastructure, including explicit recognition of risk securitisation, the legal possibility of creating independent SPVs, and absolute clarity in the tax and governance rules applicable to complex financial flows (premiums, coupons, payouts). However, most African legal systems show significant weaknesses in these areas. Few African countries have laws explicitly framing financial securitisation, and few jurisdictions integrate Insurance-Linked Securities (ILS) within a dedicated legislative corpus. This regulatory weakness generates legal uncertainty harmful to international investors, who often perceive institutional risk as greater than the climate risk itself.

Recommendation

To remedy this, African States must engage in targeted reforms to create a legal environment that is secure and conducive to risk-transfer instruments. This implies, in particular, authorising the creation of SPVs domiciled locally, regionally or internationally; defining a clear legal status for the assignment of insurance premiums to securitisation vehicles; and clarifying the taxation applicable to Cat Bond yield products. A pragmatic and efficient route would be to lean on existing regional regulators — CIMA in West Africa, COSUMAF in Central Africa, or CREPMF for WAEMU — in order to elaborate a “Framework Regulation on Alternative Risk-Transfer Instruments”. This regional approach would foster beneficial continental standardisation and significantly reduce compliance costs both for issuers and for investors. Mexico’s MultiCat programme offers a compelling example of this approach: it relied on a regulatory framework built up from the

1990s onwards to enable the State to transfer disaster risk to private entities, securing legitimacy and transparency from the outset.

The lack of depth of African financial markets

Challenge

African bond markets remain structurally under-developed and dominated by short-dated conventional sovereign securities. Traded volumes are low, secondary liquidity is limited, and the culture of investing in complex structured products such as Cat Bonds is in its infancy. By way of comparison, the average capitalisation of African bond markets relative to GDP is very low (less than 10% in WAEMU, for example) versus close to 100% in Asian emerging economies and developed economies. This situation considerably restricts the capacity to mobilise local institutional investors, who are nonetheless essential to anchor market confidence and reduce excessive dependence on volatile foreign capital.

Recommendation

To deepen these markets, the development of Cat Bonds must go hand-in-hand with the strategic strengthening of domestic capital markets. This transformation requires several coordinated actions: broaden the authorised investment framework of pension funds and insurance companies to include ILS products explicitly; create targeted tax incentives (partial coupon exemption, partial public guarantees) to stimulate local investment; and foster the creation of specialised regional funds capable of pooling subscriptions and achieving economies of scale. The example of the African Risk Capacity is encouraging.

3.2 On the Technical and Financial Front

A chronic shortfall in climate data and modelling

Challenge

The robust design of a Cat Bond rests fundamentally on sophisticated parametric models, which are themselves built on reliable, granular and long-term historical data. In most African countries, however, the climate, seismic and hydrological data essential to this work remain fragmentary, incomplete or unharmonised across sources. The WMO's (World Meteorological Organization) report No. 1360 (2023) on the State of the Climate in Africa states that only 58% (31 out of 52 surveyed members) currently provide climate services at an “essential” or “complete” level. The absence of data weakens risk modelling and mechanically leads to a conservative over-estimation of premiums by reinsurers and international investors.

Recommendation

To address this, African States — as the WMO recommends — must invest systematically in the components of the climate-information system and the early-warning system. Effective meteorological and climate services are indispensable to better manage risks linked to climate variability and long-term change in climate-sensitive sectors. The overall cost-benefit ratio of these investments is around 1:10. Moreover, when it comes to systematic investment in strengthening, at regional and national level, the operational hydrometeorological system that is indispensable to climate services, benefits outweigh costs by a ratio of about 80:1. This investment ambition rests on three

complementary axes: the urgent modernisation of national meteorological and hydrological networks; the creation of regional centres of excellence in risk modelling (within existing institutions such as AGRHYMET, ACMAD or ARC Ltd); and the adaptation of proven parametric models to African climate realities (prolonged droughts, flash floods, extreme cyclonic winds).

High structuring and transaction costs

Challenge

Structuring a Cat Bond remains a complex and financially demanding process, involving substantial expenditure on specialised legal advice, advanced actuarial modelling, financial rating and high-level intermediation. World Bank data indicate that these fixed costs can reach USD 3 – 5 million — representing up to 5% of the amount raised for modestly sized issuances (USD 50 – 100 million) — a level that may make the operation economically unviable for many African national budgets without specific support mechanisms.

Recommendation

To make issuances financially accessible, it becomes imperative to mutualise costs and to mobilise innovative concessional financing. Several avenues can be pursued at once: the creation of an “African Cat Bond Fund” to cover structuring fees and technical assistance; the establishment of pooled regional programmes, in which several countries share fixed costs and diversify risks, on the successful model of the 2018 Pacific Alliance issuance (USD 1.36 billion issued for four countries); and the strategic use of targeted subsidies from institutions or donors to fund the early stages of development. Jamaica's example

is, again, instructive: the country was able to issue its USD 185 million Cat Bond in 2021 thanks to a substantial subsidy from the Hong Kong Insurance Authority (HKIA) covering initial technical fees, with the security listed on the Hong Kong Stock Exchange.

A shortage of specialists and local capacity

Challenge

Structuring a Cat Bond requires the mobilisation of a wide range of expertise — from disaster-applied actuarial science to parametric modelling, capital-markets law and alternative-asset management. In many African countries, however, these skills are still limited and dispersed, often concentrated in a small number of public administrations, insurers or regional offices of international institutions. The rise of African solutions for climate-risk management depends heavily on strengthening local skills in modelling, claims management and the design of financial resilience instruments. This structural dependence on foreign expertise — although necessary in the current development phase — raises structuring costs and slows the transfer of know-how to local institutions.

Recommendation

To build a pool of endogenous skills, the rise of the African Cat Bond market must be accompanied by a sustained effort in training, networking and technology transfer: **(i)** develop pan-African training programmes in risk finance, aimed at training public officials, insurers and regulators in the techniques of risk-transfer modelling and structuring; **(ii)** introduce in universities and schools of economics or engineering specialised modules on

Insurance-Linked Securities (ILS) and climate finance, to prepare future professionals for these emerging careers; and **(iii)** create a pan-African network of experts and practitioners, enabling the sharing of experience and technical support among administrations, insurers and regulators.

The multidimensional challenges Africa faces in developing catastrophe bonds are undeniable, but they also reveal — as in a mirror — the path to a deep structural transformation of African public finance. By acting simultaneously and in a coordinated manner on the institutional, legal, technical and human fronts, African countries can not only equip themselves with innovative financial-resilience tools, but also build a sovereign and modern financial infrastructure serving economic stability and the lasting protection of the most vulnerable populations.

Conclusion

Climate disasters are no longer exceptional events: they have become a permanent variable in Africa's economic equation. Faced with this reality, the question is no longer whether African countries can afford to innovate in risk management, but whether they can afford not to.

Catastrophe bonds stand out as a promising path to rethinking climate-risk management at continental scale. By transferring part of the risk to global capital markets, they enable States to access fast, predictable liquidity — without compromising fiscal balance or development trajectory.

The success of this approach, however, rests on one essential condition: African ownership of the mechanism. That requires building a conducive institutional and financial environment, raising the capacity of local actors, and putting in place strategic partnerships with multilateral institutions and private investors.

This white paper therefore calls for a coalition of public and private actors to build the first African ecosystem of climate-risk finance.

Beyond disaster management, the goal is to lay the foundations of an African climate financial sovereignty, where innovation, solidarity and market discipline converge in service of the continent's resilience.

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