

Lending in a Changing Climate: Perspectives from the Reinsurance Industry

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May 2024

Munich Re at a glance and our Climate journey

Munich Re in a nutshell

144

years of risk expertise*

€29.8bn

Shareholders' equity*

#1

Global Reinsurer**

42,812

Employees*

€218.5bn

Investments*

€57.9bn

Insurance revenue*

Reinsurance

Munich RE



new/re



American MODERN



Primary Insurance

ERGO

DKV

nexible



Asset Management

MEAG

1973

MR's first global warming alert

1978

First edition of World Map of Natural Hazards

2007

Climate change defined as strategic topic → Founding Corporate Climate Centre

2011

NATHAN Risk Suite

2017

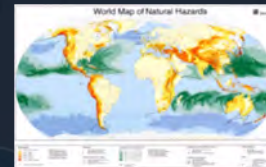
Risk Management Partners (RMP)

2020

Climate Risk Analysis Tool

2022

Climate Financial Metrics



Climate data is at the core of insurance activities

Learnings from the past to anticipate the future

Losses caused by natural disasters across the world



Overall losses



- Overall losses (in 2023 values)
- Thereof insured losses (in 2023 values)

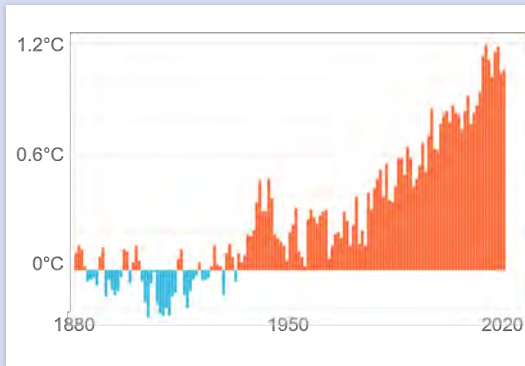
Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US\$.

Source: Munich Re, NatCatSERVICE, as of January 2024

The challenge: Climate change = Risk of change

Primary effect

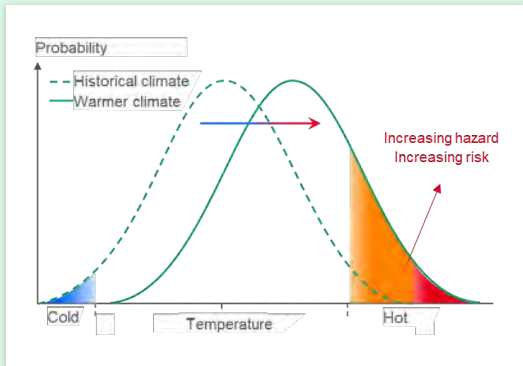
Linear temperature trend
(1881-2022): 1.2°



Annual temperature anomalies (°C)
compared to the 1880-1900 average

Secondary effect

Increase of global average temperatures
– changing probability distributions



Small increase in average temperatures
→ large increase in probability of extremes

Tertiary effect

Extremes more likely
→ Higher nat cat risks



Image: Warren Faidley / Getty Images

The global impact of climate change is becoming ever more evident

Scientific attribution studies show increasing probabilities of extreme weather events

Record heat in UK in 2022:

10 times more likely

SE Asia heatwave in 2023

**Virtually impossible without
climate change**

Image: NASA Earth Observatory

Europe floods 2021: €46bn in losses

**Likelihood of such event
has increased**

Image: Svetlana / stock.adobe.com

Typhoon Hagibis (2019): extreme rainfalls –

such events are made **2/3rd more likely
by climate change**

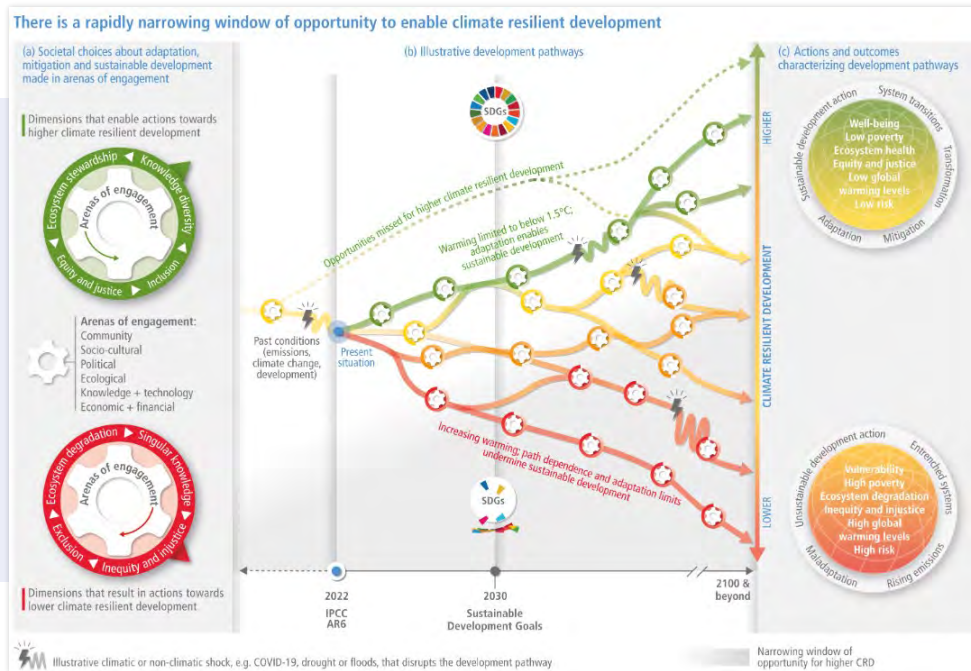
Image: Make_Video_Company / Getty Images

Climate resilient pathways

Physical climate risks will materialize as a series of shocks



How to best prepare our communities and economies to limit the impact of climate risks?



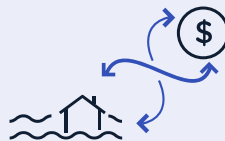
Munich Re's physical climate risk approach

Supporting our clients on their climate journey

Understand



Measure



Manage



Implications for the banking sector

Balance sheet screening to identify key exposure to climate risk

- Identification of transmission channels
- Exposure of the portfolio to key natural disasters under the present climate
- Growth in risk expected with climate change
- Identification of spatial concentrations

Tailored Climate Impact Model to assess financial impact

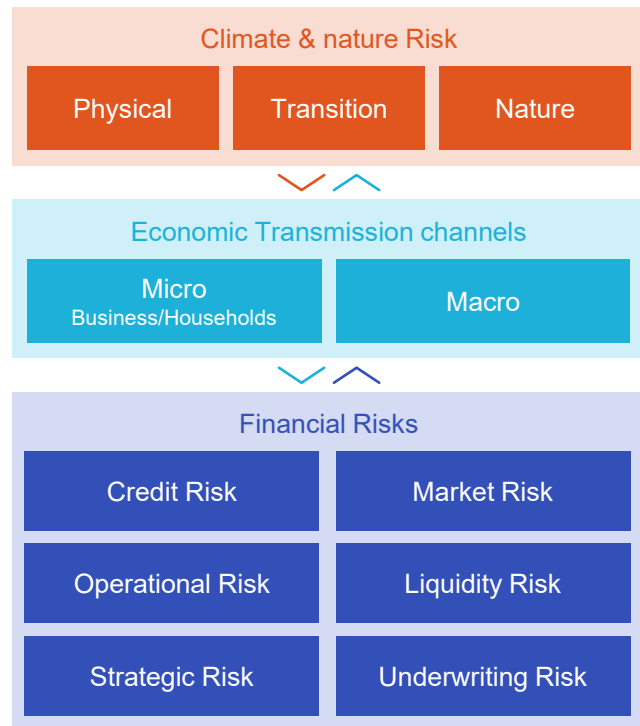
- Calculate climate value at risk
- Embed physical climate risks into credit risk models (PD/LGD)
- Analyse key climate risk concentrations to quantify potential financial impacts

Define appropriate management actions

- Articulate a clear risk appetite for physical climate risks
- Define the optimal risk management strategy
- Knowledge sharing with Board and other stakeholders

Integrated approach as climate risk is a business risk

Climate & Nature transmission channels



Integration into all core processes









Assessment of all portfolio types



Physical climate risk transmission channels

Application to residential lending

Impact drivers	Current Climate	Future Climate
Reduced Disposable Income (Probability of Default)	 High insurance premium for exposed assets	Higher insurance premium/affordability issues
	 Uninsured damages from natural disaster	Inadequacy of building standards
	 Impact on local economy post natural disaster	Long term impact on local economy
Depreciation of collateral (Loss Given Default)	 Unrepaired damages from natural disaster	Inadequacy of building standards
	 Temporary land depreciation post natural disaster	
	 Priced-in land depreciation for exposed assets	Reduced liveability in certain areas

As a fast-emerging risk, banks must adequately assess their exposure or face the risk of being anti-selected.

Munich Re's
Location Risk Intelligence
is a modular SaaS
solution that enables
users to **understand,**
measure and manage
risks from natural
hazards and climate
change around the world.



Insurance protection gaps varies greatly by markets and lines of business

Bankrate

Limited home insurance options in California as major carriers pull back

Home insurance costs spike, with parts of Australia at risk of becoming uninsurable

By climate reporter, Alex Davis
Published: 10:30 AM, 2024, at 8:40pm

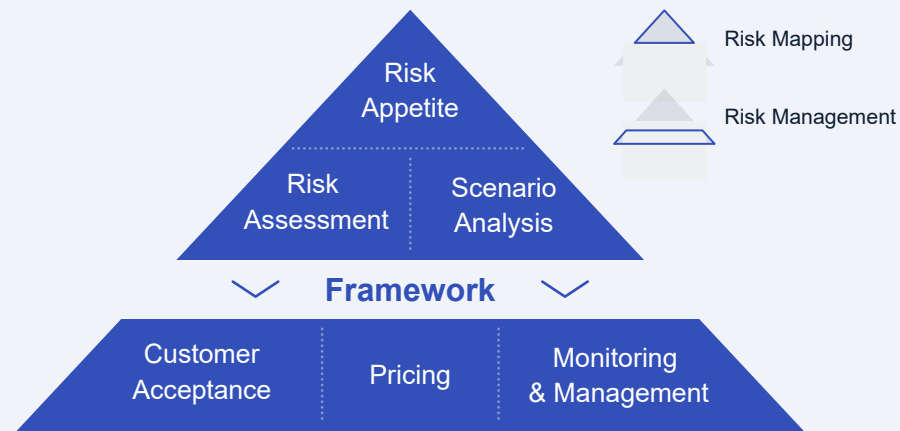


Main sources of insurance protection gap

- **Unavailability:**
In some regions and for some perils insurance solutions may no longer be available
- **Unaffordability:**
Where insurers use risk-based pricing, owners of highly exposed assets may no longer be able to afford insurance protection
- **Inadequacy:**
In order to reduce cost of insurance, policyholders may limit their insured value or exclude certain coverage

Setting up a well articulated risk appetite enables companies to manage their risk exposure more effectively

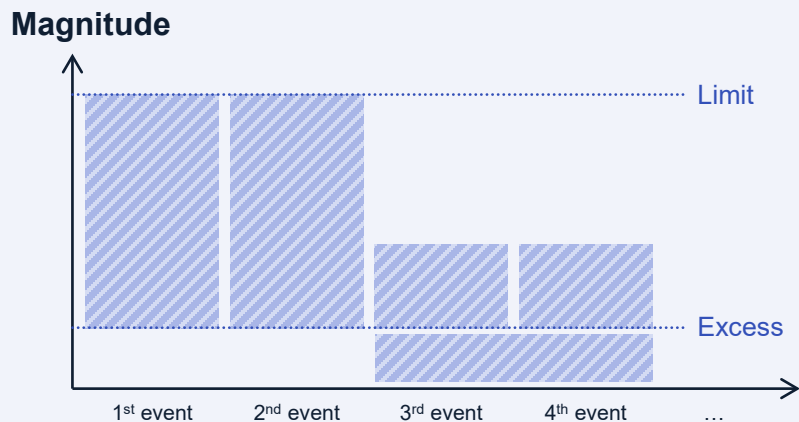
Risk appetite is at the core of Risk Management Framework



Risk appetite frameworks are typically composed of:

- **Risk appetite statement:** a clear articulation of the acceptable risk level
- **Risk Metrics:** quantitative and qualitative measure allowing the assessment of the risk level faced by the institution

A perspective from the insurance industry



Questions driving set up of reinsurance program:

- How much are we willing to lose in 1 event
- How much are we willing to lose in a series of events
- How much protection can i afford to purchase to protect my business

So what?

Possible actions to manage exposure to physical climate risk

Select the most relevant management actions depending on business objectives and implementation costs



Recommended criteria to assess the effectiveness of an action



Planning adequately for the implementation of agreed actions



Physical climate risk solutions (1/2)

A strong preference for Adaptation solutions, with emerging interest for Risk Transfer

Action ID	Action Name	Overall Score	Financial benefits for bank	Strategic benefits for bank	Borrower's benefit	Operational complexity	Compliance risk
A.i.1	Accumulation monitoring	2,10	3,00	1,25	0,25	3,00	3,00
A.i.2	Portfolio diversification	1,47	2,33	1,00	1,00	0,67	2,33
A.iv.1	Revision of loans' terms	1,60	1,00	2,33	2,33	0,67	1,67
B.i.1	Permanent exclusion areas	0,53	1,00	0,00	0,00	0,33	1,33
B.ii.1	Temporary exclusion areas	0,60	1,00	0,00	0,00	1,00	1,00
C.i.1	Origination: Enhanced process & guidelines	1,80	3,00	2,33	1,67	0,33	1,67
C.i.2	Origination: Product offering	1,07	1,67	1,33	1,00	0,33	1,00
C.i.3	In force: Resilient loan	2,33	2,33	3,00	3,00	1,00	2,33
C.ii.1	Early Warning system	1,67	0,33	2,33	3,00	0,67	2,00
C.iii.1	Temporary Revision of loans' terms	1,80	0,67	3,00	3,00	0,67	1,67
C.iii.2	Community support	1,73	1,33	2,33	1,67	1,67	1,67
C.iv.1	Resilient Loan - Build Back Better	2,33	2,33	3,00	3,00	1,00	2,33
D.i.1	Insured collaterals	1,50	2,50	0,50	1,50	1,00	2,00
D.i.2	Securitisation	1,13	0,67	0,67	0,67	2,00	1,67
D.i.3	Nat Cat LMI	1,13	1,67	1,33	1,33	0,33	1,00
D.ii.1	Evacuation cover	1,45	1,00	2,00	2,50	0,50	1,25
D.iii.1	Clean up cover	1,70	0,50	3,00	3,00	0,75	1,25
D.iii.3	Repayment holiday cover	1,90	1,50	2,50	2,50	1,00	2,00
D.iii.4	Portfolio hedge	1,67	2,00	2,00	1,50	0,60	2,25

Physical climate risk solutions (2/2)

A strong preference for Adaptation solutions, with emerging interest for Risk Transfer

Action ID	Action Name	Overall Score
A.i.1	Accumulation monitoring	2,10
B.i.1	Permanent exclusion areas	0,53
B.ii.1	Temporary exclusion areas	0,60
C.i.3	In force: Resilient loan	2,33
C.ii.1	Early Warning system	1,67
C.iii.1	Temporary Revision of loans' terms	1,80
C.iii.2	Community support	1,73
C.iv.1	Resilient Loan - Build Back Better	2,33
D.i.2	Securitisation	1,13
D.i.3	Nat Cat LMI	1,13
D.iii.3	Repayment holiday cover	1,90
D.iii.4	Portfolio hedge	1,67



If we see a peril across several climate scenarios in specific regions, we can be proactive in developing mitigation strategies and finance incentives to support borrowers in mitigating their risk .



High risk areas will drive us to better understand what/how we can work with customer to mitigate



We want to leverage solutions like these to encourage preparation for natural disasters

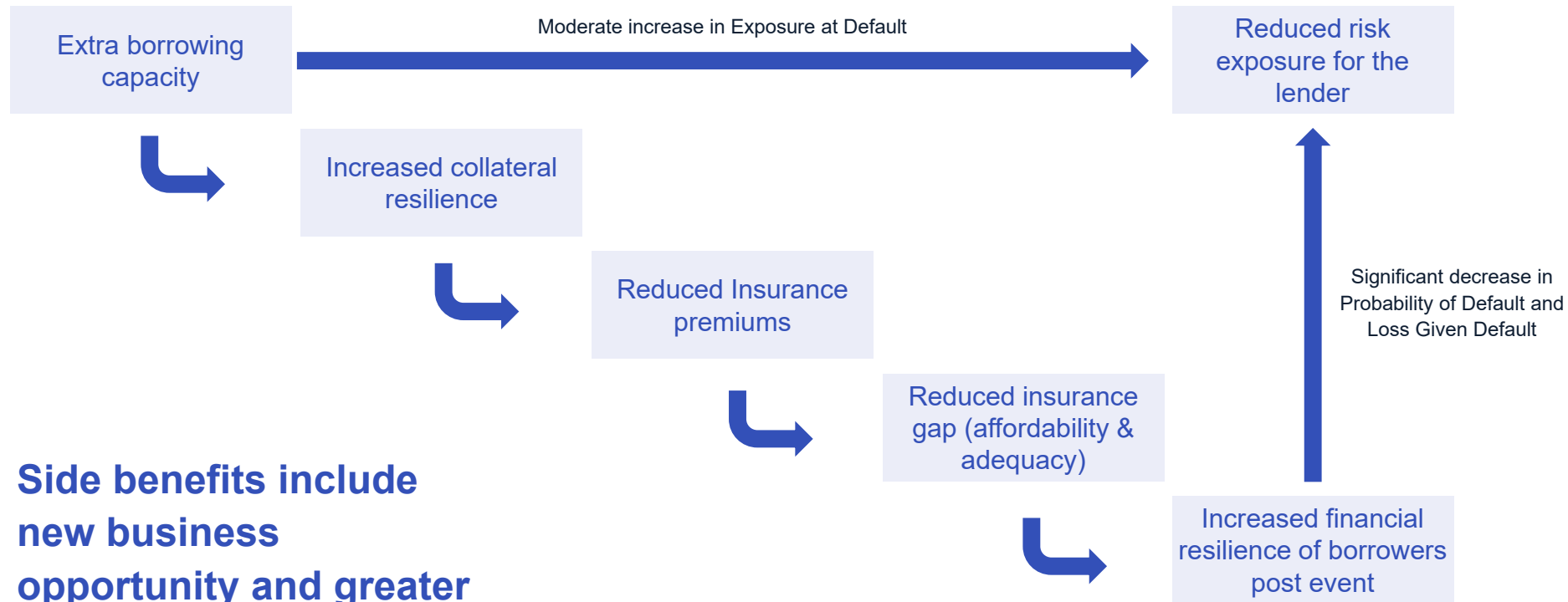


In our market, LMI is mandatory at loan origination, but banks do not have actual monitoring authority



Cannot believe this is not implemented already

Resilient loan – lending more for reduced overall risk exposure



**Side benefits include
new business
opportunity and greater
customer satisfaction**

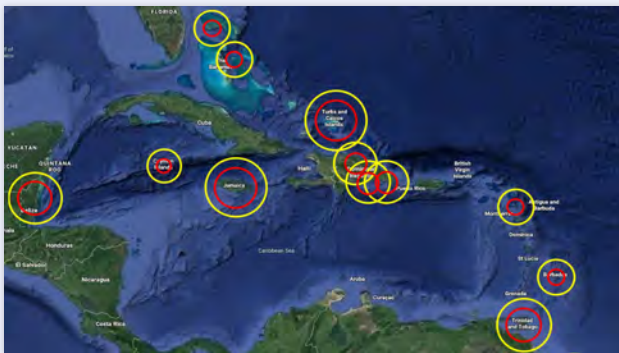
Parametric coverage of mortgage defaults due to natural catastrophes

Situation

- A bank has concerns about **mortgage defaults** could significantly **increase after a hurricane or an earthquake**
- The bank fears that their mortgage customers have not sufficient property insurance for their secondary houses in the Caribbean

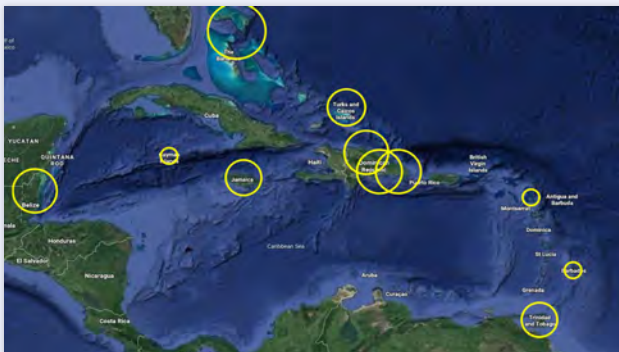
Solution & Benefits

- Under a cat-in-a-box cover, if a named storm track/ epicenter of an earthquake occurs within the specified covered circle, the bank makes a claim, gets paid according to the agreed payout
- The policy trigger depends entirely on the pronouncements of the NHC/USGS – not Munich Re. The NHC specifies the track of the storm and its windspeed. The USGS publishes information on Earthquakes occurring globally
- A hurricane may trigger several individual countries. Payouts of countries are aggregated, subject to the applicable limits



Hurricane

Payout Structure	Radii of circles	
	25 km	50 km
Cat 3	0%	0%
Cat 4	50%	25%
Cat 5	100%	75%



Earthquake

Payout Structure	Radii of circles	
	100 km	
> 7.0 Mw	25%	
> 7.5 Mw	50%	
> 8.0 Mw	100%	



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